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K. Y. Arakawa

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- Data base on its biology and propagation and cultivation methods -

By Kohman Y. ARAKAWA

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Preface

Together with the corbicula, there is probably no shellfish as favoured at our table as the Japanese short-necked clam. Even in old books the Japanese short-necked clam shows up, and it is almost invariably found in shell-mound relics in various places, making it one of the closest shellfish to us throughout history.

Consequently, there are extremely many related references on the Japanese short-necked clam which at present is an important fisheries resource. Also when it comes to the variety of experimental reports on its propagation and cultivation, there are almost too many to enumerate.

This document is one which Dr. Kohman ARAKAWA has put together in his spare time to consolidate all this literature on the Japanese short-necked clam that ranges in many directions, and is a laborious first work accomplished by the doctor who has been involved in work related to fisheries for many years. In this bibliography have been documented approximately 540 volumes including recent foreign literature, with virtually all the important ones being contained, and for the approximately 100 key volumes a summary of the contents has been appended for the convenience of users.

This bibliography is published as a special issue of the Journal of the Hiroshima Shellfish Club, and is one of our attempts to expose to the world the laborious works of our members. We should like to hope that this document will be utilized in all related quarters.

November 1985

Akihiko INABA

Representing the Hiroshima Shellfish Club

Bibliography on Japanese Short-necked Clam
Ruditapes philippinarum (Adams et Reeve, 1850)
with Annotations*

- Data base on its biology and propagation and cultivation methods -

By Kohman Y. ARAKAWA

Table of Contents

Preface (Akihiko INABA) i

Section 1. Explanatory notes 1

Section 2. Changes in and present state of Japanese short-necked clam research as viewed from the literature 2

Section 3. Bibliography on Japanese short-necked clam with annotations . . 4

Section 4. Addendum 37

Section 5. Bibliography on artificial tidelands and beaches 38

Section 6. Bibliography index by subject 39

I. Biology of Japanese short-necked clam (39)

1. General
2. Classification
3. Morphology
4. Spots and colouring
5. Physiology
6. Spawning and reproduction
7. Birth and early life history
8. Ecology

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* The gist of this paper was presented at the 78th Hiroshima Shellfish Club Session on December 19, 1981.

II. Propagation and cultivation (40)
    1. General
    2. Propagation experiments
    3. Cultivation experiments
    4. Seedling collection
    5. Transplantation
    6. Fishing grounds
    7. Resources
    8. Noxious enemies
III. Utilization, processing and hygiene (43)
    1. Cooking and processing methods
    2. Hygiene
IV. Others (44)
    1. Experimental research methodology
    2. Miscellaneous
Epilogue 45

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Section 1. Explanatory notes

1. Over 540 volumes of reference material on the Japanese short-necked clam and 19 volumes on artificial tidelands and such closely related to the propagation and cultivation of the Japanese short-necked clam published up to 1984 (including 1985 in part) have been documented.
2. Of these, approximately 300 volumes were reviewed, and approximately 100 volumes that were particularly important or had a unique content were selected and summarized.
3. The bibliography was arranged in alphabetical order of the name of the author.
4. Each reference, according to custom, has been inscribed in the following sequence:

    Reference number, name of author, year of publication: title of paper, name of publishing journal, volume number (issue number): page numbers.
5. When references by the same author or of the same title are in a row, in order to avoid repetition "———" or " " "* has been used from the second entry.
6. The name of the publishing journal has been abbreviated according to custom, but any that is not common has been given in full.
7. The index by subject is based on a combination of the name of the author and year of publication of the publishing journal, with those underlined indicating they are important references.

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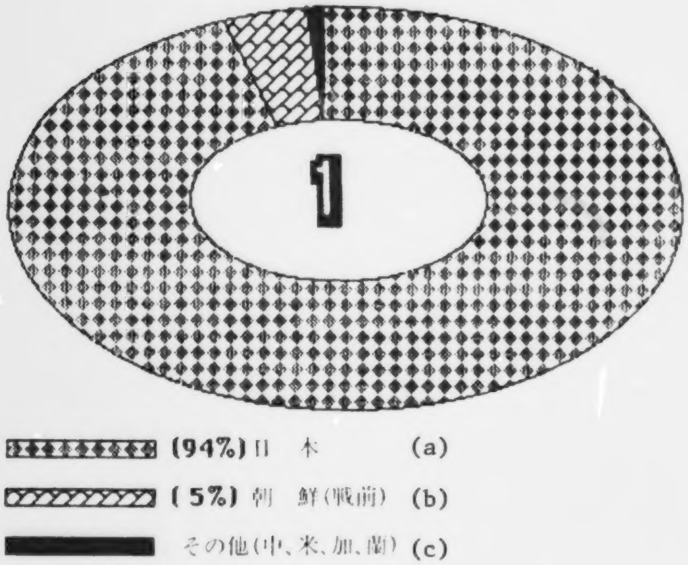
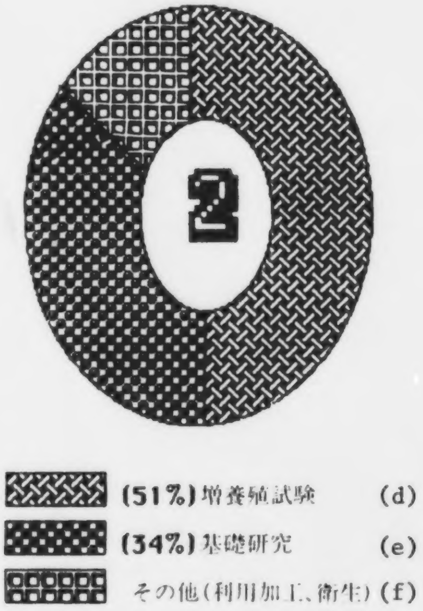
* Translator's note: Replaced by "idem" or "ibid." in the translation.

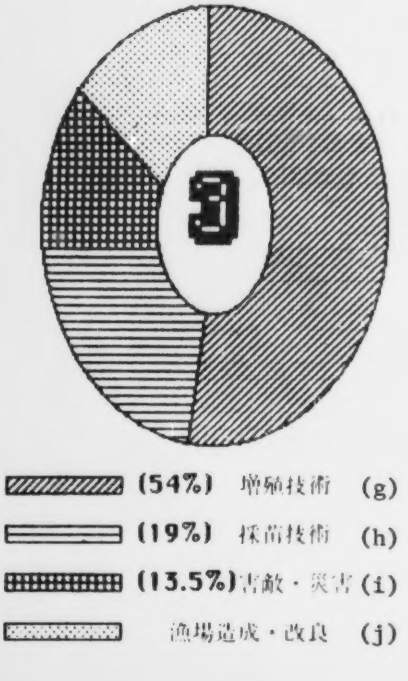
Section 2. Changes in and present state of Japanese short-necked clam research as viewed from the literature (2)

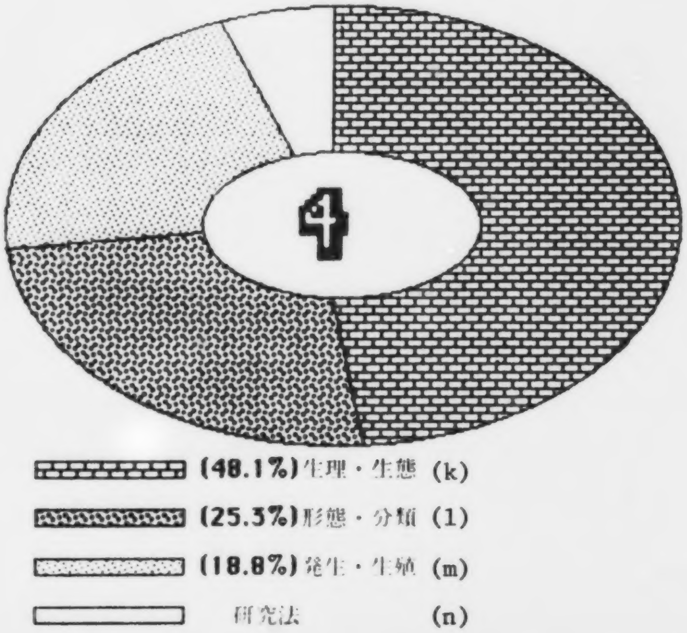
1. Comparison of number of published references by country
2. Comparison of number of references by field
3. Comparison of number of references by content related to propagation and cultivation
4. Comparison of number of references by content related to basic research

(Keyed translations on page 8)





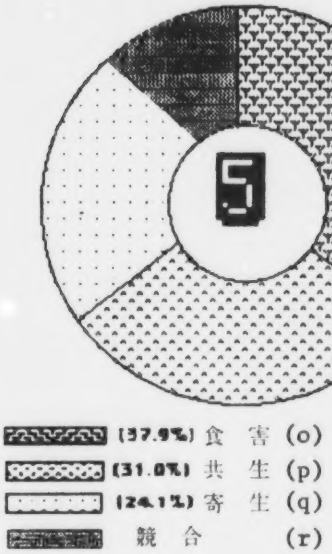




(Keyed translations on page 8)

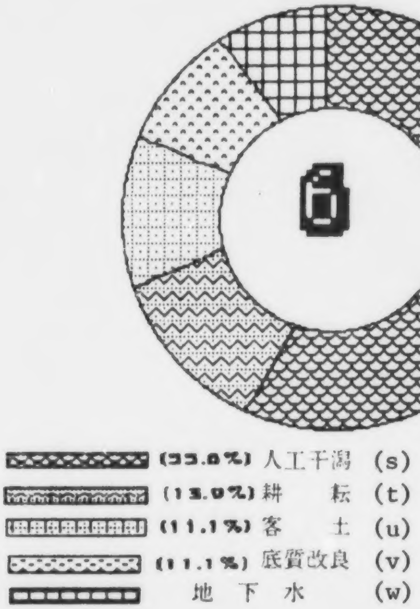
5.害敵・寄生虫関係内容別文献数の比較

5. Comparison of number of references by content related to noxious enemies and parasites



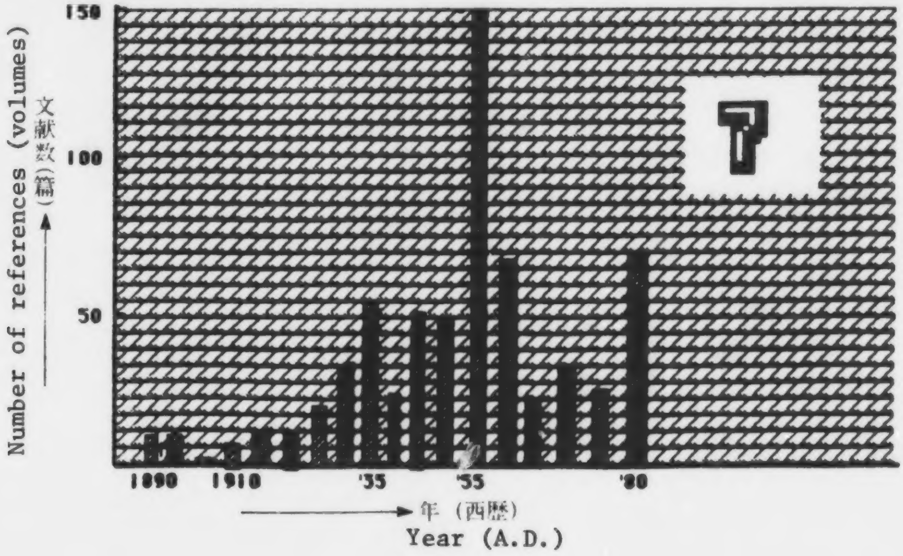
6.漁場造成・改良関係内容別文献数の比較

6. Comparison of number of references by content related to fishing ground construction and improvement



7．年次別文献発行数の推移

7. Shifts in number of references published by year



Keyed translations for Figs. 1 – 6

(a) Japan
(b) Korea (pre-war)
(c) Others (China, United States, Canada, Holland)

(d) Propagation and cultivation experiments
(e) Basic research
(f) Others (utilization, processing, hygiene)

(g) Propagation technique
(h) Seedling collection technique
(i) Noxious enemies and disasters
(j) Fishing ground construction and improvement

(k) Physiology and ecology
(l) Morphology and classification
(m) Birth and reproduction
(n) Research method

(o) Predation
(p) Commensalism
(q) Parasitism
(r) Competition

(s) Artificial tidelands
(t) Tilling
(u) Resoiling
(v) Improvement of bottom matter
(w) Underground water

Section 3. Bibliography on Japanese short-necked clam with annotations (4)

1. Aichi-ken Suisan Shikenjo (Aichi Prefecture Fisheries Experimental Station) 1896: Sanranki chosa (Asari) (Spawning season survey (Japanese short-necked clam)), Aichi Suishi Hokoku (Bulletin of the Aichi Prefecture Fisheries Experimental Station), (1896): 175-192
2. Idem 1897: Idem, Ibid., (1897): 67-78
3. Idem 1898: Idem, Ibid., (1898): 64-77
4. Idem 1925: Ise-wan asari zoshoku shiken (Ise Bay Japanese short-necked clam propagation experiments), Aichi Suishi Gyomu Gaiho (General Report on Operations of the Aichi Prefecture Fisheries Experimental Station), (1925): 46-60
5. Idem 1926: Idem, Ibid., (1926): 66-70
6. Idem 1927: Asari zoshoku shiken (Japanese short-necked clam propagation experiments), Aichi-ken Suishi Hokoku (Bulletin of the Aichi Prefecture Fisheries Experimental Station), (1927): 67-70
7. Idem 1928: Idem, Ibid., (1928): 90-92
8. Idem 1929: Idem, Ibid., (1929): 75-82
9. Idem 1930: Idem, Ibid., (1930): 82-83
10. Idem 1931: Idem, Ibid., (1931): 89-90
11. Idem 1933: Idem, Ibid., (1933): 102-104
12. Idem 1934: Idem, Ibid., (1934): 251-252
13. Idem 1935: Idem, Ibid., (1935): 200-204
14. Idem 1936: Idem, Ibid., (1936): 84
15. Idem 1931: Asari renraku shiken (Japanese short-necked clam contact experiments), Ibid., (1931): 93-100
16. Idem 1940: Asari ishoku shiken (Japanese short-necked clam transplantation experiments), Aichi-ken Suishijo Ho (Bulletin of the Aichi Prefecture Fisheries Experimental Station), (6): 6-7

17. Idem 1941: Idem, Ibid., (7): 5-6

18. Idem 1942: Asari yoshoku (Japanese short-necked clam cultivation), Aichi-ken Suishi Gyomu Hokoku (Report on Operations of the Aichi Prefecture Fisheries Experimental Station), (1942): 14-16

18a. Idem 1942: Asari seicho narabi ni kakurinmyaku keisei chosa (Survey on Japanese short-necked clam growth and shell ring-chain formation), Ibid., (1942): 17-22

19. AKIBA, Choichiro, 1949: Asari to kaki no chudoku to sono dokusei busshitsu no kenkyu (A study on poisoning by Japanese short-necked clams and oysters and their toxic substances), Nisshin Igaku (New Medicine of Japan), 36 (6): 1-14

20. Idem 1952: Asari oyobi kaki chudoku no kenkyu (A study on Japanese short-necked clam and oyster poisoning), Monbusho kagaku shiken kenkyuhi hojo ni taisuru kenkyu shuryo hokokusho (Closing report on research based on scientific experimental research funding assistance by the Ministry of Education)

21. Idem 1955: Asari to kaki no chudoku ni kansuru kenkyu (Dokugai no dokuka genin narabi ni taisaku no kenkyu) (A study on poisoning by Japanese short-necked clams and oysters (A study of the cause of toxication of poison shellfish and countermeasures)), Showa nijushichi-nijuku nendo Monbusho kagaku shiken kenkyuhi ni yoru hankenkyu hokokusho (Group research report based on 1952-1954 scientific experimental research funds of the Ministry of Education), 7-20 (Ministry of Education)

22. AKIBA, Choichiro, et al. 1950: Asari oyobi kaki chudoku no kenkyu (A study on Japanese short-necked clam and oyster poisoning), Monbusho kagaku shiken kenkyuhi hojo ni taisuru Showa nijugo nendo hokokusho (1950 annual report based on scientific experimental research funding assistance by the Ministry of Education)

23. AKIYAMA, Eiji, 1912: Asari no yoshoku ni tsuite (On the cultivation of the Japanese short-necked clam), Suisan Kenkyu Shi (Journal of Fisheries Research), 7 (11): 295-301

24. Akita-ken Suisan Shikenjo (Akita Prefecture Fisheries Experimental Station) 1922: Asarigai ishoku shiken (Japanese short-necked clam transplantation experiments), Akita Suishi Jiho (Report of the Akita Prefecture Fisheries Experimental Station), (1922): 92

25. Idem 1923: Idem, Ibid., (1923): 75-76

26. Idem 1924: Idem, Ibid., (1924): 67-68

27. AKIYAMA, Akio, and Michio MATSUDA 1974: Higata no seibutsu kansatsu handbook (Handbook on observation of tideland life), Higata no seitaigaku nyumon (An introduction to the ecology of tidelands), 329 pages, Toyokan Publishing Co., Tokyo

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29. Idem 1947a: Idem. Dai-niho. Asari ikigai yori kenshutsu sareta kenkiteki tainetsusei saikin ni tsuite (Report No. 2. On anaerobic heat-resistant bacteria detected from live Japanese short-necked clams), Ibid., 13 (2): 39-41

30. Idem 1947b: Idem. Dai-sanpo. Koba dojo sonota no seikinsu ni tsuite (Report No. 3. On the live bacteria count in factory soil and elsewhere), Ibid., 13 (3): 103-104

31. AMANOMIYA, Ikusaku, et al. 1933: Asari, himeasari, oniasari (Japanese short-necked clam, Tapes (Amygdala) variegata (SOWERBY), Protothaca jedoensis (LISCHKE)), Yuyo yugai kansho suisan doshokubutsu zusetsu (Pictorial descriptions of useful, toxic and ornamental animals and plants), pages 448-449, Daichi Shoin (Publ.), Tokyo (5)

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32. AMIO, Masaru, 1967: Hamaguri, asari no seisoku bunpu narabi ni kankyo henka ni taisuru teikosei ni tsuite (On the habitational distribution of the hard clam and Japanese short-necked clam and their resistance to environmental change), Kisomi-kawa Kako Shigen Chosa Hokoku (Kisomi River Delta Resource Survey Report), No. 4 Last volume

33. Anderson, G.J. 1982: Comments on the Settlement of Manila Clam Spat (Tapes Philippinarum) at Filucy Bay, Washington, USA. Journal of Shellfish Research, 2 (1): 111-123

34. ARAKAWA, Kohman Y., and Kiyotaka TOGE 1977: Hiroshima-ken Chiomae jinko higata zosei zengo no seibutsuso no henka (Jirei shokai) (Changes in biophase before and after construction of the Chiomae artificial tideland in Hiroshima Prefecture (Case presentation)), Suisan Doboku (Fisheries Civil Engineering), 14 (1): 45-51

35. Bourne, N. 1982: Distribution, Reproduction and Growth of Manila Clam, Tapes philippinarum (Adams and Reeves) in British Columbia. Journal of Shellfish Research, 2 (1): 47-54

36. Cahn, A.R. 1951: Clam Culture in Japan. Natural Resources Section Rept., (146): 12-24 (in English)

(Reliable material that concisely summarizes existing knowledge, both basic and applied, on the propagation and cultivation of the Japanese short-necked clam. The contents range over many areas such as growth conditions (water temperature, salinity, bottom matter, tides), reproduction and birth (eggs and sperm, spawning, growth), cultivation (cultivation method, catch method, fishing equipment), noxious enemies and damage as well as production and utilization.)

37. CHANG Hsi and CHAI Chu Yen (Editors) 1962: Hamaguriko, senshoku hamaguriko (Kaisan nantai dobutsu) (Hard clam spats and stained hard clam spats (Marine molluscs)), Chugoku Keizai Dobutsu Shi (Journal of Economic Fauna of China), pages 151-155, Scientific Publishing Co., Peking

38. CHIBA, Kenji, and Yasuo OSHIMA 1957: *Asari o shutosuru kaisan nimaigai no rosui, setsuji ni oyobosu nigori no eikyo* (Effect of turbidity on the filtering and feeding of marine bivalves, primarily the Japanese short-necked clam), *Nissuishi* (Journal of the Fisheries Society of Japan), 23 (7/8): 348-353

(Using fine bentonite powder, the filtering volume and feeding volume of several species of bivalves such as the Japanese short-necked clam were examined. The results: ① The filtering rate of the Japanese short-necked clam does not decrease even in a bentonite suspension of high concentration. ② With the Japanese short-necked clam, the feeding volume increases in proportion to the bentonite concentration until pseudo feces are excreted. ③ The pseudo feces increase linearly in proportion to the bentonite concentration, but the fecal volume does not increase at high concentration. ④ The filtering rate of the Japanese short-necked clam ia 0.6 - 1.5 L/hour at 36 - 38 mm, WT 21 - 24° C.)

39. Chiba Suisan Koshujo (Chiba Fisheries Institute) 1913: *Asari yoshoku shiken* (Japanese short-necked clam cultivation experiments), *Chiba Suiko Hokoku* (Bulletin of the Chiba Fisheries Institute), (1913): 91-97

40. Idem 1914: Idem, Ibid., (1914): 90-97

41. Idem 1915: Idem, Ibid., (1915): 97-98

42. Chiba-ken Suisan Shikenjo (Chiba Prefecture Fisheries Experimental Station) 1920: Idem, *Chiba Suishi Hokoku* (Bulletin of the Chiba Prefecture Fisheries Experimental Station), (1920): 141-145

43. Idem 1921: Idem, Ibid., (1921): 132-133

44. Idem 1922: Idem, Ibid., (1922): 150-151

45. Idem 1930: *Yoshoku asari no higai* (Damage to cultivated Japanese short-necked clams), *Chiba Suishi Naiwan Bunjo Jiho* (Report of the Chiba Prefecture Fisheries Experimental Station Inner Bay Substation), (1930): 10-13

46. Idem 1930a: *Higai kairui no fukkatsuryoku shiken* (Experiments on recovery strength of damaged shellfish), Ibid., (same issue): 13-17

47. Idem 1930b: *Chigai hassei chosa* (Survey on birth of spats), Ibid., (same issue): 17-23

48. Idem 1931: *Asari shubyo ikusei shiken* (Experiments on rearing of Japanese short-necked clam seedlings), Ibid., (1931): 1-9

49. Idem 1931a: *Asari sanranki chosa* (Survey on spawning season of the Japanese short-necked clam), Ibid., (same issue): 27-30

50. Idem 1934: *Asari zoshoku shiken* (Japanese short-necked clam propagation (6) experiments), Ibid., (1934): 1-3

51. Idem 1934a: *Asari chigai hasseichi chosa* (Survey on birth sites of Japanese short-necked clam spats), Ibid., (1934): 3-18

52. Idem 1938: *Asari chigai hassei chosa oyobi hatsuiku hogo shiken* (Survey on births of Japanese short-necked clam spats and growth protection experiments), Ibid., (1938): 3-10

53. Idem 1951: *Asari chigai no kaki nisshado ni taisuru teikoryoku to sono seitaiteki igi* *(Dai-ippo)* (Resistance of Japanese short-necked clam spats to summer insolation and its ecological significance (Report No. 1)), *Chiba Suishi Geppo* (Monthly Bulletin of the Chiba Prefecture Fisheries Experimental Station), 2 (7): 13

54. Idem 1951a: *Asari chigai no kuchu katsuryoku ni tsuite* (On the vitality in air of Japanese short-necked clam spats), Ibid., 2 (8): 10-12

55. Idem 1951b: *Asari chigai no teihiju kaisui ni taisuru teikoryoku* (Resistance of Japanese short-necked clam spats to low specific gravity seawater), Ibid., 2 (8): 8-10

56. Idem 1951c: *Asari chigai saibyochi ni okeru higata dobutsu no shokusei chosa* (Survey on feeding habits of tideland fauna in Japanese short-necked clam spat seedling collection grounds), Ibid., 2 (8): 12-13

57. Idem 1952: Kanryushiki kairui saibyo shoshisetsu no koka ni tsuite (On the effectiveness of various slow-flowing type shellfish seedling collection facilities), Ibid., 3 (1): 11-13

58. Idem 1952a: Asari chigai no hofuku sennyu dosa to nenkai bunpi ni yoru fujo gensho to ni kansuru jakkan no kansatsu (Fuyusei shigai narabi ni teisei shoki chigai no seiri seitaigakuteki kenkyu) Dai-goho (Some observations on the creeping burrowing action and the flotation phenomenon by slime clot secretion of Japanese short-necked clam spats (Physioecological studies of free-swimming young shellfish and benthic initial-stage spats) Report No. 5), Ibid., (same issue): 13-14

(Observations on the behavior on sand of Japanese short-necked clam spats (average 20 mm). Of 16 species, 2 burrowed into the sand, 2 floated to the water surface by secreting slime, 7 stuck to the tank wall by secreting byssus threads, 1 crept, and 4 specimens indicated no reaction at all. Spats burrow better in fine sand of 0.05 - 0.20 mm than in floating mud. The creeping speed is also related to the sand grain.)

59. Choe, S. 1965 : On the Morphological Variations and special Feature of the elongated and the stunted Forms in the Short Necked Clam, *Tapes japonica*. The Korean Journal of Zoology, 8(1) : 1—7

60. ———— 1966 : Studies on the natural Mortality of the young Short Necked Clam, *Tapes japonica*—I. Seasonal Variation of the Tidal Temperature, Salinity and the Effect of Overflowing Fresh Water on the Subterranean Salinity of the Tidal Flat at Low Tide. *Ibid.* 9(1) : 1—6

61. ———— 1966b : Studies on the natural Mortality of the young Short-Necked Clam, *Tapes japonica*—II. Resistance to Temperature, Salinity and Exposure for the young Short Necked Clam. *Ibid.*, 9 (1) : 7-15

62. Choi, K. C. 1965 : Ecological Studies on early Stages of the Bivalve, *Tapes philippinarum*. College of Education Review, 7(1) : 161—234

63. Chosen Sotoku-fu Suisan Shikenjo (Fisheries Experimental Station of the Government-General of Korea) 1939: Kairui seishoku jiki chosa (Asari, himeasari) (Survey on shellfish reproduction season (Japanese short-necked

clam and *Tapes (Amygdala) variegata* (SOWERBY))), *Chosen Sotoku-fu Suishi Nenpo* (Annual Bulletin of the Fisheries Experimental Station of the Government-General of Korea), 9 (3): 26-38

64. Christensen, A.M. & J.J. McDermott 1958: Life-history and Biology of the Oyster Crab, *Pinnotheres ostreum* Say. Biol. Bull., 114 (2): 146-179

65. EBIHARA, Tensei, and Yasuhiko MURATA 1967: *Asari no sanso shohiryo (Dai-ippo)* (Oxygen consumption volume of the Japanese short-necked clam (Report No. 1)), *Chiba Naiwan Suishi Chosa Hokoku* (Survey Report of the Chiba Prefecture Inner Bay Fisheries Experimental Station), (9): 89-96

    (The oxygen consumption volume of the Japanese short-necked clam was
    measured using Hall-Tamura's flowing-water type respiration volume
    measuring device. ① The relationship between flow rate and O_2 consumption
    volume is such that, even if the flow speed increases, the consumption
    volume is constant until 100 mL/min. ② Up to 15° C the consumption (7)
    volume increases linearly, at 20 - 25° C it reaches a peak, and at 30° C
    it rapidly decreases. ③ The O_2 consumption volume of the Japanese
    short-necked clam is generally in the range of 14.0 - 184.0 cc/(flesh
    weight) kg/hr. ④ From these data, a rapid decline in physiological
    activity in the high water temperature period of summer is surmised,
    and a deduction of the mortality cause is attempted.)

66. Fitch J.E. 1953: Japanese Little Neck, *Tapes semidecussata* Reeve. (In "Common Marine Bivalves of California"), Fish. Bull., (90): 67

67. FUJII, Takehito, 1979: *Nimaigai no shukiteki katsudosei ni kansuru kenkyu - 1. Shizen kankyoka deno asari ni mirareru shukisei* (Studies on the periodic activity of bivalves - 1. Periodicity seen in the Japanese short-necked clam in a natural environment), *Tohoku Suiken Ho* (Bulletin of the Tohoku Regional Fisheries Research Laboratory), (40): 37-46

    (In general seaside animals live under the dual effect of dirunal change

and tidal change, but upon observing the shell opening-and-closing action of the Japanese short-necked clam in a natural environment it can be seen that: ① there is a 24-hour cyclic variation in the degree of shell-opening; ② in the case where the water level drop at low tide is comparatively large, there is a tendency for it to correspond to that, and in cases not so there is a tendency for it to have a dormant period that tends to occur regularly, with the length of the dormant period tending to conform to the cycle of the spring tide and neap tide, and ③ on a cycle of approximately 7 days the shell-opening pattern indicates a pattern different from the others. The foregoing three are based on mutually independent rhythmic mechanisms, and the 7-day cycle rhythm corresponds indirectly through the tidal variation tendency to the revolutionary cycle of the moon of approximately 27 days.)

68. FUJIMORI, Saburo, 1929: Kairui no sanranki (Spawning season of shellfish), Ariake-kai higata riyo kenkyu hokoku (Research report on utilization of Ariake Sea tidelands), Fukuoka Suishi (Fukuoka Prefecture Fisheries Experimental Station), 1-715

69. FUJITA, Shukichi, 1937: Asari riyo shiken Dai-niho (Japanese short-necked clam utilization experiments. Report No. 2), Hoku Suishi Junpo (Ten-day Bulletin of the Hokkaido Prefecture Fisheries Experimental Station), (370): 6-9

70. FUJITA, Tatenobu, 1898: Asari kaigara no hanmon ni tsukite (On the spots on Japanese short-necked clam shells), Dozatsu (Zoology Journal), 10 (113): 85-90

71. Idem 1906: Asari ni kisei suru nishu no cercaria (Two species of cercariae parasitic in the Japanese short-necked clam), Ibid., 18 (214): 197-203

72. Idem 1907: Asari ni kisei suru cercaria no shumei (Zatsuroku) (Specific names of cercariae parasitic in the Japanese short-necked clam (Miscellaneous notes), Ibid., 19 (227): 281-282

73. Idem 1943: Asari (Japanese short-necked clam), Gyokai no shippei (Diseases of fish and shellfish), pages 211-213, Koa-Nipponsha (Publ.) Co., Tokyo

74. FUJITANI, Masaru, and Tadao NITTA 1953: Koba haisuichu ni okeru asari kaikaku undo ni tsuite (On the shell-opening behavior of the Japanese short-necked clam in factory waste water), Naisuiken Ho (Bulletin of the Inland Sea Regional Fisheries Research Laboratory), (3): 23-24

(As one method of learning the effect that factory waste water has on the Japanese short-necked clam, the relationship between the waste water concentration and shell opening and closing of the Japanese short-necked clam has been examined. Putting Japanese short-necked clams in seawater and in waste water, the number of open shells after 10, 15, 30, 45, 60, 75, 90 minutes was checked, and comparing the total cumulative numbers by adding in the number of open shells at each observation time, the number of open shells in the control (seawater) group was taken as 100 and compared with the number of open shells in each waste liquid. A waste water concentration that would lower the open shell rate to close to 30% is unsuitable for the growth of the Japanese short-necked clam, and at concentrations which indicate an open shell rate around that, it was made clear that the Japanese short-necked clam perishes after 10 hours.)

75. FUJITANI, Masaru, Shiro CHIKUNI and Yoshiyuki YAMADA 1958: Sangyo haisui no kairui ni oyobosu eikyo ni kansuru kenkyu (A study on the effect that industrial waste water has on shellfish), Naisuiken Ho (Bulletin of the Inland Sea Regional Fisheries Research Laboratory), (11): 25-39

(Using the Japanese short-necked clam, the effect that industrial waste water has on shellfish was studied from an ecological aspect based on the opening and closing of the shell and from a physiological aspect based on the absorption of Ca as the determinant. It was made clear that the comparison of Ca absorption using R.I.Ca^{45} agrees well with the opening and closing rate of the shell.)

76. Fukuda, Y. 1953: An Application of Least Squares Method to Analysis of Size Compositions. Nissuishi (Journal of the Fisheries Society of Japan), (8) 19 (4): 262-272

77. FUKUDA, Yoshio, 1954: Hyohon chosa ni yotte eta okisa betsu sosei o saisho jijoho de bunseki suru hoho ni tsuite (On a method of analyzing by the method of least squares the size compositions obtained by sampling), Hiroshima Suishi Dayori (Tidings of the Hiroshima Prefecture Fisheries Experimental Station), (35): 1-9

78. FUKUHARA, Hidenori, 1985: Asari shigen no yuko katsuyo to gyojo kanri (Gyojo gijutsu to keiei) (Effective use of the Japanese short-necked clam resource and fishing ground management (Fisheries technique and management)), Gyoson (Fishing Village), 51 (8): 18-25

79. Fukuoka-ken Suisan Shikenjo (Fukuoka Prefecture Fisheries Experimental Station) 1921: Teishitsu kaizo ni yoru asari chigai zoshoku shiken (Japanese short-necked clam spat propagation experiments by bottom matter modification), Fukuoka Suishi Jiho (Report of the Fukuoka Prefecture Fisheries Experimental Station), (1920-1921)

80. Idem 1916: Asarigai yoshoku shiken (Japanese short-necked clam cultivation experiments), Fukuoka Suishi Gyomu Kotei (Record of Operations of the Fukuoka Prefecture Fisheries Experimental Station), (1916): 22-24

81. Idem 1926: Idem, Ibid., (1926): 47-48

82. Idem 1928: Idem, Ibid., (1928): 33-35

83. Idem 1929: Idem, Ibid., (1929): 12-13

84. Idem 1930: Idem, Ibid., (1930): 13

85. Idem 1933: Asari yoshoku shiken (Japanese short-necked clam cultivation experiments), Ibid., (1933): 56-57

86. Idem 1934: Asari yoshoku shiken (Japanese short-necked clam cultivation experiments), Ibid., (1934): 95-98

87. Idem 1937: Idem, Ariake-kai Higata Riyo Kenkyu Hokoku (Research Report on Utilization of Ariake Sea Tidelands), 316-348

88. FURUKAWA, Atsushi, 1953: Hamaguri, asari no mitsudo bunpu ni tsuite (Shudankai kiji) (On the density distribution of the hard clam and Japanese short-necked clam (Proceedings of a group discussion), Nissuishi (Journal of the Fisheries Society of Japan), 18 (12): 741

89. FURUKAWA, Atsushi, and Seiya SUZUKI 1953: Senkai yoshoku seisansei no seibutsuteki kenkyu - I. Hamaguri shubyojo ni okeru hamaguri oyobi shiofuki no bunpu (Biological studies of shallow-sea cultivation productivity - I. Distribution of hard clams and Mactra Veneriformis in hard clam seedling grounds), Ibid., 18 (12): 723-726

90. FURUKAWA, Atsushi, and Akira KISO 1956: Shokukaku asari yoshoku ni tsuite (Dai-ippo) (On small compartment cultivation of the Japanese short-necked clam (Report No. 1)), Suisan Zoshoku (Fisheries Propagation), 4 (3): 1-13

    (Productivity and socioeconomic surveys of small compartment cultivation of the Japanese short-necked clam were conducted focusing on the Uehama region, Ono-cho, Saeki-gun, Hiroshima Prefecture. The contents comprise an outline of the cultivated Japanese short-necked clam, households engaged in cultivation, side businesses, cultivation method, quantity of clams harvested, households engaged in clam harvesting by month, consumption trends and such. This is something that would serve as a guide for surveys in this field hereafter.)

91. FURUKAWA, Atsushi, and Minoru HISAOKA 1957: Senkai yoshoku seisansei no seibutsugakuteki kenkyu - III. Asari no suichu kensui shiiku ni tsuite (Biological studies of shallow-sea cultivation productivity - III. On underwater suspended culture of the Japanese short-necked clam), Naisuiken Ho (Bulletin of the Inland Sea Regional Fisheries Research Laboratory), (10): 1-19

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92. FURUKAWA, Atsushi, and Akira OKAMOTO 1958: Asari no higata ni okeru kago shiken kekka ni tsuite (On the results of basket experiments with the Japanese short-necked clam on tidelands), Suisan Zoshoku (Fisheries Propagation), 6 (1): 1-9

93. FURUKAWA, Junichiro, 1931: Asari saibyo shiken, kairui no seichodo, kyakudoho (Japanese short-necked clam seedling collection experiments, rate of growth of shellfish, resoiling method), Saga Suishi Gyomu Hokoku (Report on Operations of the Saga Prefecture Fisheries Experimental Station), (1931): 23-27

94. Idem 1932: Kairui seichodo chosa (Survey on rate of growth of shellfish), Ibid., (1932): 34-35

95. FUSHIMI, Hiroshi, 1978: Hamana-ko ni okeru asari no zoshoku jigyo to kenkyu no rekishi (Propagation projects and history of research of the Japanese short-necked clam in Lake Hamana), Hamana, (202): 1-2

96. Idem 1978a: Asari gyokakubutsu no sosei to seicho (Composition and growth of the Japanese short-necked clam catch), Ibid., (209): 1-2

97. Idem 1980: Asari saigaigyo no tenki (Turning point in the Japanese short-necked clam collecting industry), Ibid., (229): 7-9

98. FUSHIMI, Hiroshi, et al. 1978: Hamana-ko ni okeru asari no seitai - 1. Gyokakubutsu sosei no henka (Ecology of the Japanese short-necked clam in Lake Hamana - 1. Changes in catch composition), Shizuoka Suishi Jiho (Report of the Shizuoka Prefecture Fisheries Experimental Station), (1977): 288-289

99. Idem 1979: Hamana-ko ni okeru asari seitai chosa (Survey on the ecology of the Japanese short-necked clam in Lake Hamana), Ibid., (1978): 299-300

100. HABE, Tadashige, 1967: Asari no shitsumon (An inquiry on the Japanese short-necked clam), Chiribotan (Spondylus cruentus LISCHKE), 4 (7): 129

101. Idem 1975: Asari (Japanese short-necked clam), Kai no Hakubutsushi - Colour Shizen Guide (Book of Knowledge on Shellfish - Coloured Nature Guide),

(25): pages 100-102, Hoikusha (Publ.) Co., Osaka

(The origin and history of and mini-information on the Japanese short-necked clam have been variously put together and described.) (9)

101a. Idem 1977: *Nimaigai-ko/kussoku-ko* *(Nihon-san nantai dobutsu bunruigaku)* (Bivalve class/Scaphopoda class (Japanese-grown mollusc taxonomy)), 372 pages, Zukan no Hokuryukan (Publ.), Tokyo

102. HAMADA, Satsuko, 1975: *Hinsanso ga kairui ni oyobosu eikyo* *(II. Shitsunai jikken)* *Norin suisan seitaikei ni okeru osen busshitsu no junkan to shihyo seibutsu ni kansuru kenkyu* (Effect of oxygen deficiency on shellfish (II. Indoor experiments) A study on pollutant circulation and marker organisms in agricultural, forestry and fishery ecosystems), *Showa yonjuhachi nendo kenkyu seiseki hokokusho* (1973 Research Achievement Report), 46-48

103. HASHIMOTO, Yoshiro, 1952: *Mahisei kaidoku no kenkyu kekka gaiyo* *(Nimaigai yudokuka genin tankyu oyobi boshi no kenkyu)* (Summary of results of research on paralytic shellfish poisoning (A study on exploring the cause and prevention of the toxication of bivalves)), *Suisan Kenkyu Kaiho* (Bulletin of the Fisheries Research Society), 4: 38-39

104. Idem 1977: *Asari doku* (Japanese short-necked clam poisoning), *Gyokairui no doku* (Fish and shellfish poison), 56-59, Tokyo University Publishing Society, Tokyo

(Since it first occurred in 1889 at Nagai in Kanagawa Prefecture, poisoning by oyster and Japanese short-necked clam that has occurred 5 times in various places has been named Venerupin after the scientific name for the Japanese short-necked clam, but the true nature of the toxin and the toxication mechanism remain unknown. In terms of symptoms, in 24 - 28 hours after ingestion, abdominal pain, nausea, ill feeling, constipation occur, and millet grain size hypodermal bloodspots can invariably be seen on the thighs, arms, chest and such. Several days later, neurosis occurs, bleeding occurs from the gums and nasal membrane, jaundice, leucocytosis and hepatic hypertrophy occur, while in severe cases dementia and a comatose state occur, with death occurring within 1 week. In the past 5 occurrences, 542 persons were poisoned and the mortality rate was 34%.)

105. HASHIMOTO, Yoshiro, Shigehide YAMADA and Takajiro MORI 1953: Kakushu suisan dobutsusei tanpaku inshi (APF) oyobi vitamin B_{12} ni tsuite - I. Gyokairui (On various marine animal protein factors (APF) and vitamin B_{12} - I. Fish and shellfish), Nissuishi (Journal of the Fisheries Society of Japan), 19 (3): 135-140

106. HASHIMOTO, Yoshiro, Shozo OTORISU, Nobuhiro FUSHIYA and Kenji NOSE 1968: Asari ekisuchu no unagi yuin busshitsu - I (Eel attractant in extract of the Japanese short-necked clam - I), Nissuishi (Journal of the Fisheries Society of Japan), 34 (1): 78-83

107. HASEGAWA, Hitoshi, Takaaki MURAMATSU, Katsuhiro SUZUKI, Keiichiro WATANABE et al. 1972: Kakushu noyaku no asari ni oyobosu eikyo ni tsuite (On the effect of various agricultural chemicals on the Japanese short-necked clam), Suisan Zoshoku (Fisheries Propagation), 20 (3): 143-146

(The concentration of 27 types of agricultural chemicals including BHC, DDT and such organic chlorine systems, organic phosphorus systems and carbamate systems that kill half the Japanese short-necked clams in 48, 72, 96 hours was examined. The need has been described, in this type of experiment, of making comparisons upon keeping constant such conditions as the water temperature and dissolved oxygen.)

108. HATANAKA, Shokichi, Ryuhei SATO and Takeo IMAI 1943: Asari, hamaguri no jinko shiiku ni tsuite (Koen yoshi) (On artificial breeding of the Japanese short-necked clam and hard clam (Gist of lecture)), Nissuishi (Journal of the Fisheries Society of Japan), 11 (5/6): 218

109. HAYASHI, Ryoji, 1954: Tokyo-wan o osou hitode (Starfish that invade Tokyo Bay), Iden (Heredity), 8 (5): 4-7

110. HAMAGUCHI, Matsuichi, 1959: Asari makitsuke jigyo (Japanese short-necked clam seeding project), Kumamoto Suishi Jiho (Report of the Kumamoto Prefecture Fisheries Experimental Station), (1950-1952): 95

111. HAMAGUCHI, Matsuichi, Wataru IKESUE and Takashi KOBAYASHI 1950: Asari zoshoku jigyo (1. Shubyo no makitsuke; 2. Jinko saibyo jigyo) (Japanese short-necked clam propagation project (1. Seeding of seedlings; 2. Artificial seedling collection project), Ibid., (1948): 49-50

112. HAMAGUCHI, Matsuichi, and Takashi KOBAYASHI 1952: Idem (A. Tamasuri kawajiri ni okeru makitsuke jigyo. B. Nagasu jisaki ni okeru makitsuke) (A. Seeding project in Tamasuri River mouth. B. Seeding on Nagasu waterfront), Ibid., (1949): 96-98

113. HIBIYA, Tamezo, 1922: Asari seicho shiken (Japanese short-necked clam growth experiments), Niigata Suishi Jiho (Report of the Niigata Prefecture Fisheries Experimental Station), (1922): 74-76

114. HIRAKI, Osamu, 1915: Ariake-kai juyo kairui seishokusen hattatsu jokyo chosa (Survey on state of gonadal development of important shellfish in Ariake Sea), Nagasaki Suishi Jiho (Report of the Nagasaki Prefecture Fisheries Experimental Station), (1915): 83

115. Idem 1916: Idem, Ibid., (1916): 97

116. HIRASE, Shintaro, 1934: Asari to himeasari wa kaigarajo kubetsu subeki ka (Koen yoshi) (Should the Japanese short-necked clam and Tapes (Amygdala) variegata (SOWERBY) be differentiated shell-wise (Gist of lecture)), Dozatsu (Zoology Journal), 46 (545): 112-113 (10)

117. HIRAYAMA, Masami, and Yasuji ANDO 1954: Kanto chiho nanbu no kosekiso-san himeasari shinashu ni tsuite (On a new subspecies of Tapes (Amygdala) variegata (SOWERBY) grown in the diluvium in the southern part of the Kanto region), Kaizatsu (Shellfish Journal), 18 (2): 109-117

118. Hiroshima-ken Suisan Shikenjo (Hiroshima Prefecture Fisheries Experimental Station) 1924: *Asari yoshoku shiken* (Japanese short-necked clam cultivation experiments), *Hiroshima Suishi Hokoku* (Bulletin of the Hiroshima Prefecture Fisheries Experimental Station), (1924): 52-55

119. Idem 1925: Idem, Ibid., (1925): 56-57

120. Idem 1926: Idem, Ibid., (1926): 68-69

121. Idem 1929: Idem, Ibid., (1929): 61

122. Idem 1931: Idem, Ibid., (1931): 63-64

123. Idem 1932: Idem, Ibid., (1932): 78

124. Idem 1933: *Asari yoshoku shiken* (Japanese short-necked clam cultivation experiments), Ibid., (1933): 77-78

125. Idem 1952: *Showa nijugo nendo senkai kairui shigen iji jigyo seisekisho oyobi chosa hokokusho* *(Tosha)* (Record of results and survey report on 1950 shallow-sea shellfish resource preservation project (Copy))

126. Idem 1952a: *Showa nijuroku nendo senkai zoshoku shigen iji hojo jigyo chukan hokokusho* *(Tosha)* (Interim report on 1951 shallow-sea propagative resource preservation support project (Copy))

127. Idem 1952b: *Higata ni okeru asari seisoku chosa no hoshiki ni tsuite* *(Tosha)* (On a method of surveying the habitation of the Japanese short-necked clam in tidelands (Copy)), *Suishi Dayori* (Fisheries Experimental Station Tidings), (24): 1-6

(With a statistical look at rational methods and procedures to survey by unit acreage sampling the habitation level and such of the Japanese short-necked clam in tidelands, the required time for each of the following operations was measured and studied. ① Determination of square sections of 50 m^2 ② Determination of measuring points (random and systematic sampling) ③ Collection of bottom matter and Japanese short-necked clams ④ Transporting of collected items to the beach and sifting them apart

⑤ Computation of number of individuals and measurement of their weight per sampling unit. The results of this study will serve as a reference for determining the personnel and hours of work when surveying the habitation level of the Japanese short-necked clam by the sampling method.)

128. Idem 1952c: Kusatsu byoku riko seisokuryo chosa (Survey of habitation level of the Japanese short-necked clam and hard clam in the Kusatsu seedling sector), Suishi Dayori (Fisheries Experimental Station Tidings), (24): 6

129. Idem 1953: Showa nijushichi nendo senkai zoshoku shigen hojo jigyo chukan hokokusho (Tosha) (Interim report on 1952 shallow-sea propagative resource support project (Copy))

130. Idem 1953a: Showa nijuroku nendo senkai zoshoku shigen iji hojo jigyo hokokusho (") (Report on 1951 shallow-sea propagative resource preservation support project (Copy))

131. Idem 1954: Asari no sanran jiki ni tsuite (") (On the spawning season of the Japanese short-necked clam (Copy)), Suishi Dayori (Fisheries Experimental Station Tidings), (35): 9-11

    (By histologically observing the seasonal changes in the gonads of the Japanese short-necked clam around Hiroshima City, the peak spawning season of the Japanese short-necked clam in this vicinity was found to be from late autumn onto early winter, with a few cases spawning until the following spring. Consequently, the spawning of the Japanese short-necked clam is best considered to be once a year.)

132. Idem 1955: Asari chigai no chosa (") (Survey on Japanese short-necked clam spats (Copy)), Ibid., (30): 8-12

133. Idem 1956: Asari shubyo no chosa (") (Survey on Japanese short-necked clam seedlings (Copy)), Ibid., (31): 9

134. Hiroshima-ken Nosei-bu Suisan-ka (Hiroshima Prefectural Agricultural Administration Division, Fisheries Section) 1982: Asari zoyoshoku no tebiki (A guide to Japanese short-necked clam propagation and cultivation), Hiroshima-ken (Hiroshima Prefecture), 28 p.

135. Hokkaido Nemuro Fukyu Shidosho (Hokkaido Prefecture Nemuro Dissemination Advisory Office) 1981: Asari gyojo zosei (Japanese short-necked clam fishing ground construction), Gyoson (Fishing Village), 47 (2): 21-23

(Hokkaido's Nemuro Bay central fishing cooperative waterfront had been a good fishing ground for the Japanese short-necked clam, but because the environment had deteriorated by erosion and the accumulation of floating mud, a fishing ground was constructed and restoration of the resource was attempted. By scraping the surface (mud) soil, filling in new sand and laying crushed rock, and then stacking sandbags around the periphery to prevent the sand from washing away, the ground was made 15 cm higher than the surroundings to prevent the accumulation of floating mud. Seeding 27 tons of Japanese short-necked clam seedlings (25.1 - 45.0 mm, 13.5 g/individual) in the 7.749 m^2 built-up fishing ground, two years later 23.5 tons of adult clams (30 - 65 mm, 19.5 g/individual) and 0.5 ton of seedlings were obtained.)

136. Hokkaido-ritsu Suisan Shikenjo (Hokkaido Prefectural Fisheries Experimental Station) 1962: Kaki, asari no shiokara no seiho ni kansuru kaito (Answers concerning the preparation process of salted oysters and Japanese short-necked clams), Suisan Gijutsu Mondoshu (Collection of Questions and Answers on Fishery Techniques), pages 35-36 (11)

137. Holland, D.A. & K.K. Chew 1974: Reproductive Cycle of the Manila Clam *Venerupis japonica* from Hood Canal, Washington. Proc. Natl. Shellfish Assoc., 64: 53-58

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138. HONDA, Hisayoshi, Masanobu SAEKI, Yasushi YOSHIOKA et al. 1975: Kennai-san shokuhin no sogo osen chosa (Dai-ippo) (Comprehensive contamination survey of food produced within the prefecture (Report No. 1), Chiba Eiken Hokoku (Bulletin of the Chiba Hygienic Research Institute), 24: 36

139. HORI, Yoshimichi, and Takaaki ISHIKAWA 1980: Asari chosa (Showa gojuyon nendo hogo suimen chosa) (Japanese short-necked clam survey (1979 protected water survey)), Mie-ken Ise-wan Suishi Nenpo (Annual Bulletin of the Mie Prefecture Ise Bay Fisheries Experimental Station), 1-15

140. HORIGUCHI, Shinji, 1967: Asari no kako ni kansuru shiken (1) (Experiments on processing of the Japanese short-necked clam (1)), Chiba Suishi Hokoku (Bulletin of the Chiba Prefecture Fisheries Experimental Station), (5): 120-127

141. HORII, Shozo, Tatsuo YAMAGISHI and Hajime MURAKAMI 1978: Tokyo-wan no asari to teishitsuchu no jukinzoku bunpu (Heavy metal distribution in the Japanese short-necked clam and bottom matter of Tokyo Bay), Tokyo Eiken Nenpo (Annual Bulletin of the Tokyo Hygienic Research Institute), (29): 170-175

    (Heavy metals in municipal waste water ultimately flow into the sea, and accumulate on the sea bottom by adhesion to suspensoids in seawater, ion exchange or as insoluble salts, which are ingested by aquatic organisms and get concentrated. The particularly lowly ambulatory so-called sedentary Japanese short-necked clam has been taken up as a heavy metal contamination marker organism, and as part of the monitoring activity for heavy metal contamination of fish and shellfish in Tokyo Bay a comparative survey of the heavy metals contained in the bottom matter and Japanese short-necked clam within the bay was conducted.)

142. HORITA, Hideyuki, and Tadashi TAMURA 1953: Ana o ugareta asari no senko ichi ni tsuite (On the perforation location of the Japanese short-necked

clam perforated with a hole), Hokudai Suisangakubu Iho (Bulletin of the Fisheries Faculty, Hokkaido University), 4 (3): 216-218

(Observations on the location, size and shape of the perforation of the shell of the Japanese short-necked clam by Neverita didyma and other boring snails. ① The perforation location is in the central area in most cases and almost never seen in the peripheral area. ② The size of the hole, in order of smallness, follows the order Neverita didyma, Thais bronni, Thais clavigera problematica, Ocenebra japonica (DUNKER).)

143. HOZUMI, Motoo, 1959: Asari no shoka mono ni fukumareru shibo bunkai koso ni kansuru kenkyu - I (Koen yoshi) (Studies on lipase contained in the digestive diverticulum of the Japanese short-necked clam - I (Gist of lecture)), Dozatsu (Zoology Journal), 62 (2/3): 62

144. Idem 1959a: Asari no shoka mono ni fukumareru shibo bunkai koso ni kansuru kenkyu - II. Kishitsu tokuisei (Koen yoshi) (Studies on lipase contained in the digestive diverticulum of the Japanese short-necked clam - II. Substrate specificity (Gist of lecture)), Dozatsu (Zoology Journal), 68 (2/3): 30

145. IDE, Kiyoshi, and Yoshijiro KATO 1942: Shizuoka-ken Arai-cho o chushin to shite bakuhatsu seru asari chudoku no gaikyo ni tsuite (On the general state of Japanese short-necked clam poisoning that erupted centering in Arai-cho, Shizuoka Prefecture), Nihon Koshu Hoken Kyogikai Zasshi (Journal of the Public Health Council of Japan), 18 (5):

146. IIKURA, Toshihiro, 1978: Fuyu, kendaku busshitsu no ido kara mita higata no kankyo ni tsuite (On the environment of tidelands as viewed from the movement of floating and suspended matter), Suisan Doboku (Fisheries Civil Engineering), 14 (1): 25-31

147. IKEBE, Katsuhiko, Yukio TANAKA, Ryoichi TANAKA and Shinji KUNIDA 1977: Shokuhinchu no jukinzoku no ganyuryo ni tsuite (Dai-roppo) - Gyokairui

oyobi jucho kujira nikurui no jukinzoku no ganyuryo (On the heavy metal content in foods (Report No. 6) - Heavy metal content in fish and shellfish as well as animal, fowl and whale meat), *Shokueishi* (Journal of Food Hygiene), 18 (1): 86-97

148. IKEDA, Sakujiro, 1893: *Asari kairuigara no hanmon ni tsuite* (On the spots on Japanese short-necked clam shells), *Dozatsu* (Zoology Journal), 5 (56): 222-226

149. Idem 1893a: Idem, Ibid., 5 (58): 292-295

150. Idem 1894: Idem, Ibid., 6 (63): 13-18

151. Idem 1894a: Idem, Ibid., 6 (64): 39-43

152. IKESUE, Wataru, 1941: *Asari no seicho to kankyo to no kankei ni tsuite* (On the relationship between the growth of the Japanese short-necked clam and the environment), *Suisan Kenkyu Shi* (Fisheries Research Journal), 36 (5): 82-89

153. Idem 1943: *Juyo kairui seishoku jiki oyobi saisho seitai chosa* (Survey (12) on the reproductive season and smallest adults of important shellfish), *Kumamoto Suishi Jiho* (Report of the Kumamoto Prefecture Fisheries Experimental Station), (1940-1941): 78-79

154. Idem 1953: *Asari no hassei to kankyo yoin ni tsuite (Yoho)* (On the birth of the Japanese short-necked clam and environmental factors (Preliminary report)), *Ariake-kai Kenkyu Hokoku* (Ariake Sea Research Bulletin), (1): 10-34

155. Idem 1957: *Asari no seitaigakuteki kenkyu - II. Chinchakki to shoki seicho* (Ecological studies on the Japanese short-necked clam - II. Settlement period and early growth), *Nissuishi* (Journal of the Fisheries Society of Japan), 22 (12): 736-741

156. Idem 1957a: Idem - III. *Chinchaku shoki ni okeru bunpukei ni tsuite* (On the distribution pattern in the early stage of settlement), *Ariake-kai Kenkyu Hokoku* (Ariake Sea Research Bulletin), (4): 13-19

157. Idem 1960: Senkai zoshoku kenkyu no genjo to mondaiten (Asari) (Present state of and problem points in shallow-sea propagation research (Japanese short-necked clam)), Norin Suisan Gijutsu Kaigi Shiryo (Agricultural, Forestry and Fisheries Technique Conference Data), 79-94

158. Idem 1966: Asari yoshoku (Ariake-kai ni okeru suisangyo tenbo) (Japanese short-necked clam cultivation (Outlook for fisheries industry in Ariake Sea)), Suisan Zoyoshoku Sosho (Fisheries Propagation and Cultivation Series), (10), 48 pages, Fisheries Resource Protection Society of Japan, Tokyo

159. IKESUE, Wataru, and Koji KUKIDA 1947: Showa nijuichi nendo no Tamana-gun Kasseki-mura ni okeru asari chigai hassei jokyo chosa (1946 survey on the state of birth of Japanese short-necked clam spats in Kasseki-mura, Tamana-gun), Kumamoto Suishi Jiho (Report of the Kumamoto Prefecture Fisheries Experimental Station), (1947): 52-57

160. IKESUE, Wataru, and Takashi KOBAYASHI 1950: Asari, hamaguri no kanryu-shiki saibyoho no koka ni tsuite (Fu) Showa nijusan nendo no Tamana-gun Kikuchi kawajiri ni okeru asari chigai hassei jokyo chosa (On the effectiveness of a slow-flowing type method of seedling collection of the Japanese short-necked clam and hard clam (Appendix) 1948 survey on the state of birth of Japanese short-necked clam spats in the Kikuchi River mouth, Tamana-gun), Kumamoto Suishi Jiho (Report of the Kumamoto Prefecture Fisheries Experimental Station), (1948): 50-58

161. IKESUE, Wataru, Takashi KOBAYASHI and Shigeyuki KOMINATO 1952: Idem, Ibid., (1949): 98-107

162. IKESUE, Wataru, and Tadashi MATSUMOTO 1956: Asari no seitaigakuteki kenkyu - I. Chinchaku shoki asari no teihiju narabi ni koon ni taisuru teikoryoku (Ecological studies on the Japanese short-necked clam - I. Resistance to low specific gravity and high temperature of the Japanese short-necked clam in the early stage of settlement), Ariake-kai Kenkyu

Hokoku (Ariake Sea Research Bulletin), (3): 16-23

(Japanese short-necked clams of 0.21 - 1.40 mm in the early stage of settlement: ① at a specific gravity of 1.015 - 1.012 survived over 1 month without feeding (optimum specific gravity); at 1.010 perished in part after 10 - 15 days; at 1.005 all under 0.3 mm perished in 1 week; at 1.000 (fresh water) all under 0.3 mm perished in 4 - 6 hours; ② with respect to high temperatures, at 40° C all perished within 1 hour; at 37° C all perished within 5 hours; and at 35 - 36° C all perished within 15 hours.)

163. IKESUE, Wataru, and Jiro WAKITA 1955: Asari zoshoku o mokuteki to shita higata kyakudo no kenkyu - I. Ryudo sosei no henka (Studies on tideland resoiling aimed at Japanese short-necked clam propagation - I. Change in grain composition), Ariake-kai Kenkyu Hokoku (Ariake Sea Research Bulletin), (2): 9-29

164. Idem 1957: Idem - II. Chigai no hasseiryo kara mita kyakudo no koka ni tsuite (On the effect of resoiling as viewed from the quantity of births of spats), Ibid., (4): 1-12

(While the propagative effect on Japanese short-necked clam seedlings due to resoiling (spreading of sand) varies by place and year, at places where the sand ratio is 40% or more there is no need for resoiling. In places abounding in soft mud is where the resoiling effect can be clearly discerned, there being cases that exhibited 2 - 4 times the habitation density of control sectors. The most rational method of resoiling is to spread small amounts of sand at a time from time to time according to the accumulation of floating mud and its state of flow.)

165. IKESUE, Wataru, Tetsutaro ISOZAKI, Takashi KOBAYASHI, Shigeyuki TABATA and Isao MIYOSHI 1959: Senkai kairui shigen iji jigyo (Shallow-sea shellfish resource preservation project), Kumamoto Suishi Jiho (Report of the Kumamoto Prefecture Fisheries Experimental Station), (1950-1952): 125-128

166. IKESUE, Wataru, Yataro TANAKA, Masatada KURODA, Shigeo EBIRA, Hisako MOROKUMA and Tadashi YAMAGUCHI 1963: *Josozai PCP no suisan seibutsu ni taisuru dokusei* (Toxicity of the herbicide PCP to marine organisms), *Seikai Suiken Hokoku* (Bulletin of the Seikai Regional Fisheries Research Laboratory), (28)

167. INABA, Toru, 1974: *Kyodo no aji* (Taste of home), *Chiribotan* (*Spondylus cruentus* LISCHKE), 8 (3): 54-62

168. INO, Takashi, Junichiro SAGARA, Satsuko HAMADA and Michinori TAMAKAWA 1954: *Nimaigai no hyoshiki hoho no ichiyoshiki oyobi sore ni yoru seitaigakuteki jikken no ichirei* (One method of marking bivalves and an example of an ecological experiment using that), *Suisan Zoshoku* (Fisheries Propagation), 2 (1): 39-46

169. INO, Takashi, Yasuo OSHIMA et al. 1955: *Higata no koun koka ni kansuru shiken* (Experiments on the effect of tilling of tidelands), *Senkai naiwan zoshoku jigyo oyobi jigyo koka chosa hokokusho* (Survey report on shallow-sea inner bay propagation project and project effectiveness), 82-119 (13)

170. INOUE, Yasushi, 1954: *Asari shubyo makitsuke jigyo koka ni tsuite (Senkai zoshoku ni kansuru chosa kenkyu)* (On the effectiveness of a seeding project of Japanese short-necked clam seedlings (Survey study on shallow-sea propagation)), *Yamaguchi Naikai Suishi Chosa Kenkyu Gyoseki* (Survey Study Results of the Yamaguchi Prefecture Inland Sea Fisheries Experimental Station), 3 (4): 13-21

(Seeding Japanese short-necked clam seedlings in tidelands where the habitation of the Japanese short-necked clam was hitherto not seen, a survey was done over a one year period to see what kind of yield rate and growth would be needed to make this viable as an enterprise. Location factors that indicate results exceeding 65% in yield rate and 3.2 times in the rate of weight increase are desirable.)

171. Idem 1954a: Bohatei ni yoru kanryu to asari hassei seisokuryo to no kankei (Relationship between slow flow due to a breakwater and the birth and habitation level of Japanese short-necked clams), Ibid.,

172. Idem 1956: Asari no seisoku mitsudo to seicho to no kankei (Relationship between the habitation density and growth of the Japanese short-necked clam), Yamaguchi-ken Suishi Jiho (Report of the Yamaguchi Prefecture Fisheries Experimental Station), (1955): 39-41

(Seeding Japanese short-necked clam seedlings (averaging 16.6 mm, 1.36 g) at densities of 1,000 monme*/2,532 seedlings/tsubo**, 1,500 monme/3,797 seedlings/tsubo and 2,000 monme/5,063 seedlings/tsubo respectively, the growth rates were compared. As a result, while there was no significant difference between 1,000 monme/tsubo and 1,500 monme/tsubo, there was a difference between 1,000 monme/tsubo and 2,000 monme/tsubo. In the final analysis, about 3,000 grains/tsubo is surmised to be the optimum density.)

173. Idem 1977: Higata no seibutsu seisanryoku (Bioproductivity of tidelands), Suisan Doboku (Fisheries Civil Engineering), 13 (2): 11-15

174. Idem 1980: Yamaguchi, Oumi-wan ni okeru asari no seitai to kankyo ni tsuite (On the ecology of the Japanese short-necked clam and the environment in Yamaguchi and Oumi Bays), Ibid., 16 (2): 29-35

(The results of surveys from various aspects such as the spawning, free-swimming larvae, settled spats, growth and noxious enemies of the Japanese short-necked clam, and the water quality, bottom matter and soil base in the Oumi Bay tidelands which make up 14% of the Japanese short-necked clam production rate in Yamaguchi Prefecture have been pertinently summarized, and will serve as a good reference in considerations on the Japanese short-necked clam and the environment.)

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* Translator's note: A Japanese unit of weight, 1 monme = 3.759 g

** Translator's note: A Japanese unit of area, 1 tsubo = 3.305 m^2

175. INOUE, Yasushi, and Akemi YAMADA 1954: Asari nikei no seicho narabi ni keitai no henka ni tsuite (Senkai zoshoku ni kansuru chosa kenkyu) (On the growth and changes in morphology in two forms of the Japanese short-necked clam (Survey study on shallow-sea propagation)), Yamaguchi Naikai Suishi Chosa Kenkyu Gyoseki (Survey Study Results of the Yamaguchi Prefecture Inland Sea Fisheries Experimental Station), 3 (4): 1-11

176. INOUE, Yasuo, 1972: Senkai kaihatsu to kankyo hozen - senkai doboku koji to no kanren ni oite (Shallow-sea development and environmental protection - in connection with shallow-sea civil engineering works), Nogyo Doboku Kaishi (Journal of the Agriculture Civil Engineering Society), 40 (10): 36-41

(Among the effects that shallow-sea civil engineering works have on fisheries, the effect of muddiness due to floating mud has been focused on, and instances involving seaweed beds and marine organisms have been taken up and pertinently summarized. In terms of the effect on Japanese short-necked clams in particular, if ones 30 - 33 mm big are buried in kaolin mud, at a mud depth of 1.5 cm they took 7 days to surface, with 10% perishing. At a mud depth of 3.0 cm, half revealed part of their shells on the surface or near the surface, with the death of 20% being seen. With bivalves in general, if the floating mud concentration gets high the filtration rate decreases due to clogging of the filtering apparstus.)

177. ISAHAYA, Takao, and Toyotaro KAWAI 1933: Atsukeshi ni okeru asari ni tsuite (On the Japanese short-necked clam in Atsukeshi), Hoku Suishi Junpo (Ten-day Bulletin of the Hokkaido Prefecture Fisheries Experimental Station), (209): 5-6

178. Idem 1933a: Futatabi Atsukeshi kanko ni okeru asari ni tsuite (Once again on the Japanese short-necked clam in Atsukeshi salt lake), Ibid., (224): 11-12

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179. ISHIDATE, Morizo, and Haruo HAGIWARA 1952: Todai Ritchi Kenho (Bulletin of the Tokyo University Location Research Laboratory), (10): 43

180. ISHIKAWA, Takaaki, 1970: Showa yonjuyon nendo asari sojo hogo suimen chosa hokokusho (1969 survey report on Japanese short-necked clam seaweed bed protected waters), Mie-ken Ise-wan Suishi (Mie Prefecture Ise Bay Fisheries Experimental Station), 1-30

181. Idem 1971: Showa yonjugo nendo asari sojo hogo suimen chosa hokokusho (1970 survey report on Japanese short-necked clam seaweed bed protected waters), Ibid., 1-20

182. ITO, Susumu, and Takuro KOGISO 1953: Fukushima-ken Matsukawa-ura ni okeru asari, hamaguri no zoshoku ni kansuru kenkyu. Dai-niho. Asari, hamaguri no sanran hassei kikan chosa oyobi saibyo shiken kekka ni tsuite (14) (Studies on propagation of the Japanese short-necked clam and hard clam in Matsukawa Inlet, Fukushima Prefecture. Report No. 2. On the results of a survey of the spawning and birth period and experiments on seedling collection of the Japanese short-necked clam and hard clam), Fukushima-ken Suisan-ka (Fukushima Prefecture, Fisheries Section)

183. IWAKAWA, Tomotaro, 1908: Asari asari (Kairui manroku shichi) (Japanese short-necked clam (Shellfish random notes 7)), Kairui Zasshi (Shellfish Journal), 2 (4): 115-116

184. IWATA, Seiji, 1948: Karyumuen chusha ni yoru asari, hamaguri, bakagai nado no horan hosei gensho (Egg-discharge and sperm-discharge phenomena of the Japanese short-necked clam, hard clam, round clam and such due to potassium salt injection), Nissuishi (Journal of the Fisheries Society of Japan), 13 (6): 237-240

(Focusing on the muscle contracting action of K salts, using several species of bivalves such as the Japanese short-necked clam as samples, the results of injecting KCl, KNO_3, KBr, K_2SO_4 and such ① from the slit

between the shells, and ② upon severing the adductor muscles, respectively, were compared. In the case where the K salts were injected from the slit between the shells, 70% of the Japanese short-necked clams had a discharge, albeit of a small amount. In the case where those whose adductor muscles had been severed on one side were injected, 91% had a discharge of a large amount. The Japanese short-necked clam eggs obtained by this method, even though germinal cells are discernible, are both big and small and contain many impurities, so that even if they are artificially fertilized as they are, they will not germinate. There is a need for pretreatment with ammonia seawater, hypertonic water and such.)

185. Idem 1948a: Nimaigai ni okeru shafutsu kaikaku kiko (Mechanism of shell-opening by boiling in bivalves), Nissuishi (Journal of the Fisheries Society of Japan), 14 (2): 82-86

(Using the Japanese short-necked clam and several other species of bivalves, the mechanism of shell-opening by boiling is experimentally explained. With the Japanese short-necked clam, the shell-opening strength of the ligament increases in an S-shaped curve with a rise in temperature, while the shell-closing strength of the adductor muscles weakens as the temperature rises, so that the shell becomes half open. This manner of opening is such that, when 70° C is exceeded the strength of the adductor muscles slightly strengthens so that a balance with the shell-closing strength occurs, transitioning in a steady state, and about the time 85° C is exceeded, suddenly the holding strength of the ligament reaches its limit and both shells fully open. With the hard clam, from the vicinity of 85° C, the shell which had once started opening closes, and about the time 90° C is somewhat exceeded, it suddenly fully opens.)

186. Kagawa-ken Suisan Shikenjo (Kagawa Prefecture Fisheries Experimental Station) 1922: Asarigai yoshoku shiken (Japanese short-necked clam cultivation

experiments), Kagawa Suishi Gyomu Hokoku (Report on Operations of the Kagawa Prefecture Fisheries Experimental Station), (1923): 14-15

187. Idem 1933: Senkai riyo shiken asari hamaguri no ishoku shiken (Shallow-sea utilization experiments; transplantation experiments on the Japanese short-necked clam and hard clam), Ibid., (1933): 99-101

188. Idem 1948: Asarigai yoshoku shiken (Japanese short-necked clam cultivation experiments), Ibid., (1948): 67-70

189. Kanagawa-ken Suisan Shikenjo (Kanagawa Prefecture Fisheries Experimental Station) 1919: Senkai riyo shiken (Shallow-sea utilization experiments), Kanagawa Suishi Hokoku (Bulletin of the Kanagawa Prefecture Fisheries Experimental Station), (1919): 19-53

190. Idem 1920: Idem, Ibid., (1920): 70-96

191. Idem 1921: Idem, Ibid., (1921): 87-109

192. Idem 1938: Asarigai yoshoku shiken (Japanese short-necked clam cultivation experiments), Ibid., (1938): 29-31

193. Idem 1939: Idem, Ibid., (1939): 38-40

194. Idem 1940: Idem, Ibid., (1940): 36-37

195. Idem 1941: Idem, Ibid., (1941): 38-40

196. KANEMARU, Tadama, 1941: Nihon kairuigakushi (24) (Asari no hanmon ni ataerareta meisho) (History of Japanese conchology (24) (Names given to the spots on the Japanese short-necked clam)), Kaizatsu (Shellfish Journal), 11: 36-69

(The names given to the spots on the Japanese short-necked clam from ancient times have been explained with the aid of diagrams. Example: Katabaashi (half shell ear black), Urakaze (white).)

197. KANEMARU, Tadama, and Iwao TAKI 1943: Asari chudoku jiken (Shinbun kirinukicho) (Japanese short-necked clam poisoning incidents (Newspaper clipping scrapbook)), Ibid., 12 (3/4): 205-208

198. KASAMURA, Katashi, 1930: *Asari no yoshoku* (Cultivation of the Japanese short-necked clam), *Suisankai* (Fisheries World), 18 (6): 18-25

199. Idem 1930a: Idem, Ibid., 18 (7): 18-25

200. KASAMURA, Katashi, and Mansaku HAYASHI 1935: *Kakujitsu shuri kansui yoshoku no jissai (Jokan)* (The reality of certain profit-making salt-water cultivation (First volume)), Teiokai Publishing Division, 260 pp.

201. KATO, Mitsujiro, 1951: *Yoshoku asari o heishi saseta muchokachu Convoluta* (The acoelous flatworm Convoluta that killed cultivated Japanese short-necked clams), *Shigenken Iho* (Bulletin of the Resource Research Institute), (19-21): 64-87

202. KAWAI, Hiroshi, and Takaaki ISHIKAWA 1979: *Hogo suimen chosa* (Survey of protected waters), *Mie-ken Ise-wan Suishi Nenpo* (Annual Bulletin of the Mie Prefecture Ise Bay Fisheries Experimental Station), (1977): 93-94

203. KAWABE, Hiroshi, Koichiro YOSHIDA and Shinji NAKAJIMA 1981: *Arao-shi jisaki gyojo no asari no shigen ni tsuite* (On the Japanese short-necked clam resource in the fishing ground on the Arao City waterfront), *Kumamoto Noriken Jiho* (Report of the Kumamoto Prefecture Laver Research (15) Institute), (1979): 178-209

204. Idem 1981a: *Tamana chiku daikibo zoshokujo kaihatsu jigyo (asari) no koka chosa - 1* (Survey of effectiveness of large-scale propagation ground development project (Japanese short-necked clam) in the Tamana region - 1), Ibid., (same year): 230-237

205. KAWAMOTO, Takasuke, 1934: *Asari no kara no henshoku (Kairui zasso (5))* (Change of colour of the shell of the Japanese short-necked clam (Shellfish notes (5))), *Kaizatsu* (Shellfish Journal), 4 (5): 310-311

206. Kenkoshoku o Kangaeru Kai (Hen) (Society of Health Food Believers (Ed.)) 1975: *Asari (Kai no kenkoho)* (The Japanese short-necked clam (How to keep healthy with shellfish)), 61-65, Arrow Publishing, Higashihara

207. Kimura, K. & R. Ichikawa 1970: Uptake of Rutherium-106 by Short-necked Clam, *Nissuishi* (Journal of the Fisheries Society of Japan), 36 (7): 653-660

208. KINOSHITA, Toraichiro, and Ichizo NAKAGAWA 1934: *Ouyoraku no senko ni tsuite no kansatsu* (Observations on the boring of *Ocenebra japonica* (DUNKER)), *Yoshoku Kaishi* (Journal of the Cultivation Society), 4 (10): 187-190

209. KINOSHITA, Toraichiro, and Sabugoro SHIBUYA 1939: *Hokkaido-san asari no shumei to sanranki ni tsuite* (On the specific names and spawning season of Hokkaido-grown Japanese short-necked clams), *Hoku Suishi Junpo* (Ten-day Bulletin of the Hokkaido Prefectural Fisheries Experimental Station), (410): 3-7

210. KISHIMOTO, Genji, 1978: *Asari ni oyobosu NH_4-N nodo to ondo no eikyo ni tsuite* (On the effect of NH_4-N concentration and temperature on the Japanese short-necked clam), *Fukuoka Buzen Suishi Kengyoho* (Report on Research Operations of the Fukuoka Prefecture Buzen Fisheries Experimental Station), (1976): 26-31

211. KISHIGAMI, Kamakichi, 1908: *Asari kaigara no hanmon* (The spots on the shell of the Japanese short-necked clam), *Kairui Zasshi* (Shellfish Journal), 2 (12): 410-411

212. KISO, Akira, and Atsushi FURUKAWA 1953: *Asari no hiidosei ni tsuite (Nihon Suisan Gakkai Chushikoku Shibu Showa Nijushichi Nendo Taikai Kiji)* (On the non-mobility of the Japanese short-necked clam (Proceedings of the 1952 Conference of the Chushikoku Branch of the Fisheries Society of Japan)), *Nissuishi* (Journal of the Fisheries Society of Japan), 18 (12): 738

(In order to ascertain whether Japanese short-necked clams move or not, experiments were done by marking Japanese short-necked clams. ① When a vat was filled with seawater and Japanese short-necked clams were put in they moved briskly, but in soil they hardly moved. ② Live Japanese short-necked clams were left for 40 days in a partitioned cultivation ground, but they hardly moved. ③ When Japanese short-necked clams fixed in formalin were buried in the middle of the cultivation ground, the surrounding Japanese short-necked clams almost all moved far away within 1 - 3 weeks. From the foregoing, Japanese short-necked clams do not move unless there is some special environmental change.)

213. KITAMURA, Isamu, 1937: Asari era no senmo undo to ondo to no kankei (Relationship between the ciliary movement of the gills of the Japanese short-necked clam and temperature), Nissuishi (Journal of the Fisheries Society of Japan), 6 (3): 154

(Cutting out the inner lobe of the gill of the Japanese short-necked clam to 5 mm^2, the speed of ciliary movement in a water temperature range of 0 - 36° C was examined. With Japanese short-necked clams 3.5 - 4.5 cm big, at a seawater specific gravity of 1.01812, the maximum speed was at 23.4° C, being 2.39 cm (average value). At 0 and 36° C there was no movement whatsoever.)

214. KITANI, Koji, and Yasushi INOUE 1979: Asari no sunanuki to yuso ni kansuru kenkyu (A study on de-sanding and transport of the Japanese short-necked clam), Yamaguchi Naikai Suishi Hokoku (Bulletin of the Yamaguchi Prefecture Inland Sea Fisheries Experimental Station), (7): 35-43

(Looking at the relationship between the water temperature and vitality of the Japanese short-necked clam, in a water temperature range of minus 2.5 - 37.5° C the survival rate after 6 hours was 100%. After 24 hours the survival rate in summer at 30° C or below was 100% and in winter at 25° C or below it was 100%. Looking at the resistance to air exposure, in summer at 10° C or below the survival rate was 100% for 3 days or less, and in winter at 0.5 - 5° C it was 100% for 6 days. In terms of dissolved oxygen, at 1 cc/L or less at a water temperature of 15° C the survival rate was 100% for 5 days. Thirty - 60% of Japanese short-necked clams have sand in the coelom, while 90 - 100% contain mud in the digestive tract. In summer at a water temperature of 20 - 30° C de-sanding is completed in 12 hours, while in winter at 10° C the majority finish de-sanding after 12 hours. The speed of de-sanding is proportional to the water temperature. Also, the de-sanding effect, in order of largeness, follows the order of natural seawater>artificial seawater>coarse salt water>NaCl solution (saline solution). For transport (air exposure), de-sanding beforehand results in the fewest deaths.)

215. KAMEDAKA, Yosuke, and Kenichi KAGAWA 1953: Higata no sanka kangen deni narabi ni fushoku ni tsuite (Higata seibutsu no seitai ni kansuru shomondai shudankai kiji) (On the oxidation-reduction potential and erosion of tidelands (Proceedings of a group discussion on various issues concerning the ecology of tideland organisms)), Nissuishi (Journal of the Fisheries Society of Japan), 18 (2): 742 (16)

216. KO, Yoshio, 1957: Asari seishokuso ni tsuite no ni, san no soshikigakuteki kansatsu (Two or three histological observations on the gonads in the Japanese short-necked clam), Ibid., 23 (7/8): 394-399

(The fluctuation in the gonads of Sasebo-grown Japanese short-necked clams were histologically observed. ① In winter and summer they atrophy without forming virtually any gametes, so that the undergoing of a twice-yearly ripening process can be surmised. In autumn many of the Japanese short-necked clams 11 - 12 mm big have ripe gonads, some of which possess reproductive capability. Also, many of those 15 mm or over possess reproductive capability. ② With those subjected to suspended breeding (June - December), the development of the gonads starts immediately, and gonads enlarged to the extreme are rapidly attained. While this state continues for a long time, at the end of autumn abnormalities can be seen in the gonads without exception, causing dysfunctions due to the abnormal environment.)

217. Idem 1959: *Kaichu suika shiiku asari no seishokuso no hatsuiku ni tsuite* (On the growth of the gonads of Japanese short-necked clams bred by underwater suspension), *Nagasaki Daigaku Suisangakubu Kenkyu Hokoku* (Research Bulletin of the Fisheries Faculty, Nagasaki University), (8): 202-206

218. Idem 1969: *Kyosei dokyakurui Ostrinocola koe no asari kakuchu ni okeru seishoku oyobi hentai ni tsuite* *(Yoho)* (On the reproduction and metamorphosis of the commensal copepod *Ostrinocola koe* in the shell of the Japanese short-necked clam (Preliminary report)), Ibid., (27): 1-7

219. Idem 1969a: *Asari nado nimaigai kakuchu ni kyosei suru dokyakurui Ostrinocola koe no seikatsushi* (Life history of the copepod *Ostrinocola koe* which lives commensally in the shell of bivalves such as the Japanese short-necked clam), Ibid., (28): 73-82

220. Idem 1969b: *Kyosei dokyakurui yonshu no asari kakuchu ni okeru seisoku jokyo* (Habitation pattern of four species of commensal copepods in the shell of the Japanese short-necked clam), Ibid., (28): 83-91

(The emergence period, rate of symbiosis and the number of symbionts per host of four species of commensal copepods, *Lichomorgus*, *Modiolicola*, *Conchyliurus*, *Ostrinocola*, that live in Sasebo-grown Japanese short-necked clams were examined. ① *L. inflatus* symbiose as spawned organisms in April - June, and the rate of symbiosis gradually increases, reaching 70% terminally. The number of symbionts per host is small. ② *M. bifida* occur year-round except for September - October, and compared to the other three species the number of symbionts is small. ③ *C. quintus* symbiose year-round, and the number of symbionts per host is high, peaking in May and June. ④ *O. koe* are seen to symbiose in large number year-round. Except for March - June, both the rate of symbiosis and the number of symbionts are the highest among the four species. During March - June, *C. quintus* have the highest.)

221. Idem 1969c: *Kyosei dokyakurui wa Ostrinocola koe no gaibu keitai - I. Copepodid ki* (External morphology of the commensal copepod *Ostrinocola koe* - I. Copepodid stage), Ibid., (28): 93-109

222. KO, Yoshio, Kazuma YOSHIKOE and Nobuo ITO 1974: *Nimaigai gaitoko ni seisoku suru Ostrinocola koe no gaibu keitai - II. Nauplius ki* (External morphology of *Ostrinocola koe* which inhabit the mantle cavity of bivalves - II. Nauplius stage), *Nagadai Suisangakubu Kenho* (Research Bulletin of the Fisheries Faculty, Nagasaki University), (38): 87-93

223. KO, Yoshio, and Kazuma YOSHIKOE 1974a: *Nimaigai gaitoko ni seisoku suru dokyakurui Ostrinocola koe no shukushu saihen ni yoru kakugai shiiku* (Ectovalvular breeding in the host gill segment of the copepod *Ostrinocola koe* which inhabit the mantle cavity of bivalves), Ibid., (38): 95-100

224. Idem 1974b: *Nimaigai gaitoko ni seisoku suru dokyakurui Ostrinocola koe no ettoki ni okeru kaon shiiku* (Warm breeding during the overwintering stage of the copepod *Ostrinocola koe* which inhabit the mantle cavity of bivalves), Ibid., (38): 101-107

225. Ko, Y., Murakami & K. Daiku 1962: The Biology of the commensal Copepods in Japanese Marine Bivalves. Records of Oceanogr. Wks. Japan (Sp. No. 6): 113-119

226. KOBAYASHI, Takashi, 1959: *Yokojima-mura jisaki ni okeru asari makitsuke jigyo (Showa nijugo nendo)* (Japanese short-necked clam seeding project on the Yokojima Village waterfront (1950)), *Kumamoto Suishi Jiho* (Bulletin of the Kumamoto Prefecture Fisheries Experimental Station), (1950-1952): 175

227. Kobayashi, Y., K. Tsubaki & M. Soneda 1953: Marine Yeasts isolated from Little-neck Clam. Bull. Nat. Sci. Museum, 33: 47-52

228. KONDO, Takeo, 1955: *Asari doku no biseibutsu ni yoru teiryoteki kentei* (17)
ni tsuite *(Dokugai no dokuka genin narabi ni taisaku no kenkyu)* (On quantitative tests of Japanese short-necked clam poison using microorganisms

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(A study of the cause of toxication of poison shellfish and countermeasures)), *Showa nijushichi-nijuku nendo Monbusho kagaku shiken kenkyuhi ni yoru hankenkyu hokokusho* (Group research report based on 1952-1954 scientific experimental research funds of the Ministry of Education), 87-96

229. KONO, Tomomi, 1984: *Habahiroku taberareru asari to hamaguri (Sekai no sakana ryori to shokuhin kaihatsu ④)* (The widely edible Japanese short-necked clam and hard clam (Seafood dishes of the world and food development ④)), *Suisan no Kenkyu* (Research on Fisheries), 3 (4): 36-38

230. Korringa, P. 1976: Farming Little-neck Clams on the Algarvian Coast, Portugal. Farming Marine Organisms Low in the Food Chain, 243-259. Elsevier, Amsterdam

231. KOSUGA, Tadao, 1967: *Asari kara shinju* (Pearls from the Japanese short-necked clam), *Chiribotan* (*Spondylus cruentus* LISCHKE), 4 (5): 79

232. KUMAGAI, Hiroshi, 1973: *Suisan seibutsu no hiso oyobi jukinzoku ganyuryo (Sono san)* (Arsenic and heavy metal content in marine organisms (Part 3)), *Yamaguchi-ken Eiken Nenpo* (Annual Bulletin of the Yamaguchi Prefecture Hygienic Research Institute), (16): 123-125

233. KUMAGAI, Hiroshi, and Kiyoko SAEKI 1980: *Asari ni okeru jukinzoku ganryo no kisetsuteki hendo* (Seasonal variation in heavy metal content in the Japanese short-necked clam), *Nissuishi* (Journal of the Fisheries Society of Japan), 46 (7): 851-854

    (The seasonal variation in the heavy metal content of 11 species of Yamaguchi-grown Japanese short-necked clams was examined. In terms of seasonal variation, there are two types: one which indicates a virtually constant value year-round like Se, Cu, Zn and As, and one which indicates a peak in winter like Hg, Cd, Pb, Cr, Ni, Co and Mn.)

234. Kumamoto-ken Nori Kenkyujo (Kumamoto Prefecture Laver Research Institute) et al. 1979: *Asari* *(Tamana chiku)* (Japanese short-necked clam (Tamana

region)), Daikibo zoshokujo kaihatsu jigyo chosa sogo hokokusho (Composite report on survey of large-scale propagation ground development project), (1978): 1-69

235. Kumamoto-ken Nori Kenkyujo (Kumamoto Prefecture Laver Research Institute) 1981: Asari no shubyojo keisei yoin ni tsuite no kenkyu (A study on the prerequisites for forming a seedling ground for the Japanese short-necked clam), Showa gojugo nendo shitei chosa kenkyu sogo josei jigyo hokokusho (1980 report on coordinated subsidized projects on designated survey studies), 1-23

236. Kumamoto-ken Suisan Shikenjo (Kumamoto Prefecture Fisheries Experimental Station) 1923: Asari yoshoku shiken - higata chosa (Japanese short-necked clam cultivation experiments - tideland survey), Kumamoto Suishi Gyomu Kotei (Record of Operations of the Kumamoto Prefecture Fisheries Experimental Station), (1923): 35-36

237. Idem 1924: Idem, Ibid., (1924): 91-121

238. Idem 1925: Idem, Ibid., (1925): 84-86

239. Idem 1926: Idem, Ibid., (1926): 45-46

240. Idem 1945: Asari yoshoku jigyo (Japanese short-necked clam cultivation project), Ibid., (1945): 7-8

241. Idem 1946: Idem, Ibid., (1946): 26-27

242. Idem 1947: Idem, Ibid., (1947): 66-68

243. Idem 1948: Idem, Ibid., (1948): 49-50

244. Idem 1949: Asari, hamaguri no kanryushiki saibyoho no koka ni tsuite (On the effectiveness of a slow-flowing type method of seedling collection of the Japanese short-necked clam and hard clam), Kumamoto Suishi Jigyo Hokoku (Report on Operations of the Kumamoto Prefecture Fisheries Experimental Station), (1949): 98-107

245. KURASHIGE, Eijiro, 1941: Chosen ni okeru asari jo no ryudo sosei yori mitaru doshitsu (Soil quality as viewed from the grain composition of the Japanese short-necked clam grounds in Korea), Umi to Sora (Sea and Sky), 21 (6): 125-136

246. Idem 1941a: Chosen-san asari no chishi suion (Asari no seikatsuryoku ni oyobosu kankyo yoso hendo no eikyo - I) (Lethal water temperature for Korean-grown Japanese short-necked clams (Effect of variation in environmental factors on the vitality of the Japanese short-necked clam - I)), Shokubutsu oyobi Dobutsu (Plants and Animals), 9 (12): 522-528

247. Idem 1941b: Asari no kuchu katsuryoku to roshutsu jikan (Asari no seikatsuryoku ni oyobosu kankyo yoso hendo no eikyo - II) (The vitality in air and duration of exposure of the Japanese short-necked clam (Effect of variation in environmental factors on the vitality of the Japanese short-necked clam - II)), Suisan Gakkai Ho (Bulletin of the Fisheries Society), 8 (3/4): 190-208

248. Idem 1941c: Asari no kuchu katsuryoku to tainai suibun no shoshitsu (Asari no seikatsuryoku ni oyobosu kankyo yoso hendo no eikyo - III) (The vitality in air and loss of body moisture of the Japanese short-necked clam (Effect of variation in environmental factors on the vitality of the Japanese short-necked clam - III)), Ibid., (same issue): 209-217

249. Idem 1942: Roshutsuchu no ondo to Chosen-san asari no seikatsuryoku (Asari no seikatsuryoku ni oyobosu kankyo yoso hendo no eikyo - V) (The temperature during exposure and the vitality of Korean-grown Japanese short-necked clams (Effect of variation in environmental factors on the vitality of the Japanese short-necked clam - V)), Kaizatsu (Shellfish Journal), 11 (4): 134-142

(Exposing Japanese short-necked clams under humid conditions, the vitality and resistance at air temperatures of 10 - 30° C were experimented on.

① At 10° C even after 1 week only a few were seen to die, but at 15° C (18) the number of days of survival averaged 7 days or more, while the average number of days of survival at 20, 25, 30° C was 3.5, 2.8, 1.3 days, respectively. ② The more prolonged the number of days of exposure gets, the weaker becomes the sand-burrowing capability of the surviving Japanese short-necked clams.)

250. Idem 1942a: Roshutsuchu no koon narabi ni teion ni taisuru asari no teikosei (Asari no seikatsuryoku ni oyobosu kankyo yoso hendo no eikyo - VI) (Resistance of the Japanese short-necked clam to high temperatures and low temperatures during exposure (Effect of variation in environmental factors on the vitality of the Japanese short-necked clam - VI)), Ibid., 11 (4): 142-153

(The resistance of Japanese short-necked clams to high temperatures and low temperatures in humid conditions was examined. ① The average survival time at an air temperature of 37.5° C was 9.7 hours, at 40° C 5.7 hours, at 42° C 2.0 hours, at 44° C 0.5 hour. ② The resistance to low temperatures differs considerably between winter and summer. In summer even at -2° C considerable impairment can be seen, but in winter hardly any abnormality can be discerned. Also, in winter at -5° C survival averaged 9 hours.)

251. Idem 1942b: Kaisui enbun no henka ni taisuru Chosen-san asari no teikosei (Asari no seikatsuryoku ni oyobosu kankyo yoso hendo no eikyo - IV) (Resistance of Korean-grown Japanese short-necked clams to changes in seawater salinity (Effect of variation in environmental factors on the vitality of the Japanese short-necked clam - IV)), Nikkaishi (Journal of the Oceanographic Society of Japan), 1 (1/2): 29-43

(In the range of 1.018 - 1.027 in seawater specific gravity even over a long period absolutely no abnormality can be discerned. At 1.015 after

2 months some deaths could sometimes be seen. In the 1.000 - 1.005 range all perished in 8 days. At 1.029 even after a lapse of a long period there were few deaths, so the resistance to high specific gravity can be seen to be strong.)

252. Idem 1942c: Joon okeru Chosen-san asari no chishi sansoryo (Asari no seikatsuryoku ni oyobosu kankyo yoso hendo no eikyo - VII) (Lethal oxygen level for Korean-grown Japanese short-necked clams at normal temperature (Effect of variation in environmental factors on the vitality of the Japanese short-necked clam - VII)), Ibid., (same issue): 123-132

(The resistance of Japanese short-necked clams to oxygen deficiency in a water temperature range of 15 - 25° C was examined. ① After surviving for 3 days in 0.5 cc/L seawater, on the 4th - 5th day impairment was discerned and in 10 days all perished. ② At around 1 cc/L there was no abnormality for 20 days or more.)

253. Idem 1942d: Kaisuichu no fuyudo ni taisuru Chosen-san asari no teikosei (Asari no seikatsuryoku ni oyobosu kankyo yoso hendo no eikyo - VIII) (Resistance of Korean-grown Japanese short-necked clams to floating soil in seawater (Effect of variation in environmental factors on the vitality of the Japanese short-necked clam - VIII)), Suisan Gakkai Ho (Bulletin of the Fisheries Society), 9 (1): 23-25

254. Idem 1942e: Asari oyobi hamaguri zoshoku no kihon mondai (Fundamental problems in Japanese short-necked clam and hard clam propagation), Kaiyo no Kagaku (Ocean Science), 2 (5): 347-351

(On the premise that, in order to improve the production of benthic organisms that dwell in intertidal shallow seas like the Japanese short-necked clam, it is only when the three factors of reproduction, nutrition and habitation have been made clear that the objective can be reached, existing knowledge has been summarized and the problems left for the future are given an outlook.)

255. Idem 1943: Asari no sennyu sokudo ni oyobosu roshutsu no eikyo (Asari no seikatsuryoku ni oyobosu kankyo yoso hendo no eikyo - IX) (Effect of exposure on the burrowing speed of the Japanese short-necked clam (Effect of variation in environmental factors on the vitality of the Japanese short-necked clam - IX)), Nikkaishi (Journal of the Oceanographic Society of Japan), 3 (1): 18-31

(The burrowing capability into the sand base of the Japanese short-necked clam: ① is more vigorous with the smaller-sized ones; ② most vigorous in an air temperature range of 25 - 30° C; ③ diminishes considerably below 10° C or above 35° C; and ④ if the loss of body moisture is small, is not affected by exposures of a short duration.)

256. Idem 1943a: Asari no tekisei joken to shite no higata no jiban narabi ni doshitsu no hendo (Asari no seikatsuryoku ni oyobosu kankyo yoso hendo no eikyo - X) (Variation in the soil base and soil quality of tidelands as a suitable habitation factor for the Japanese short-necked clam (Effect of variation in environmental factors on the vitality of the Japanese short-necked clam - X)), Ibid., 3 (2): 94-117

(① Even looking at the birth of Japanese short-necked clam spats, the places where the adults do not live are unstable in soil base and soil quality. ② A suitable ground for the birth of Japanese short-necked clam spats is a location where the flow is not rapid and where topographically and sea state-wise the seawater readily collects and eddies easily occur. ③ Even if mud is contained relatively abundantly in the beach soil, if the soil base is stable it is suitable as a habitat for the Japanese short-necked clam.)

257. Idem 1943b: Chosen no higata (Tidelands of Korea), Kaiyo no Kagaku (Ocean Science), 3 (8): 29-33

258. Idem 1943c: Chosen-san asari no seitai narabi ni nikuseibun no kisetsuteki shocho to sanranki (Seasonal fluctuations in the living body and meat component and the spawning season of Korean-grown Japanese short-necked clams), Chosen Sotoku-fu Suishi Hokoku (Bulletin of the Fisheries Experimental Station of the Government-General of Korea), (8): (19)

259. Idem 1944: Kai no seisoku higata (Tidelands inhabited by shellfish), Ibid., (Special edition) (13): 1-38

260. Idem 1944a: Chosen ni okeru higatachi no asari seisokuryo (Habitation level of the Japanese short-necked clam in the tideland grounds of Korea), Nikkaishi (Journal of the Oceanographic Society of Japan), 3 (4): 216-223

261. Idem (Fumio MATSUMOTO ed.) 1957: Asari no seitai kenkyu, toku ni kankyo yoso ni tsuite (A study on the ecology of the Japanese short-necked clam, with particular reference to environmental factors), Suisangaku Shusei (Compilation on Fisheries Science), 611-555, Tokyo University Publishing Society

(A comprehensive compilation of the author's studies on the tie-in of ecology and environment as the basic elements of Japanese short-necked clam propagation and cultivation, the contents comprise 18 chapters on the lethal water temperature for the Japanese short-necked clam, the temperature and vitality, the lethal oxygen level, the resistance to floating soil, the resistance to shock, the resistance to pH and such, and include 4 sections (4 chapters) of unpublished papers. For Japanese short-necked clam researchers it is well worth reading.)

262. Idem 1944b: Shogeki ni taisuru Chosen-san asari no teikosei (Resistance of Korean-grown Japanese short-necked clams to shock), Suisan Gakkai Ho (Bulletin of the Fisheries Society), 9 (2/3/4): 153-160

263. KURASHIGE, Eijiro, and Fusoo OTA 1942: Sekido ni yoru suichu yozai sanso no kyushu ni kansuru jikken (Experiments on the absorption of dissolved

oxygen in water by beach soil), Nikkaishi (Journal of the Oceanographic Society of Japan), 1 (1/2): 1-14

264. KURATA, Yoji, and Toshio IIMURA 1954: Ugui no kairui shokugai (Shellfish predation by daces), Sai to Shi (Collecting and Raising), 16 (8): 233-235

265. Idem 1954a: Hototogisugai no hanshoku to yogaijo no higai (Multiplication of Musculus (Musculista) senhousia (BENSON) and damage to shellfish cultivation grounds), Ibid., 16 (9): 267-270

(In tidelands covered with Musculus (Musculista) senhousia (BENSON) mats, 60% of the resident shellfish perished. The order was Mactra Veneriformis>Moerella juvenilis (HANLEY)>hard clam>Japanese short-necked clam. Cases seen in Tokyo Bay in 1948-1952.)

266. KURODA, Takeya, 1938: Asari, hamaguri yoshoku shiken (Japanese short-necked clam and hard clam cultivation experiments), Kumamoto Suishi Hokoku (Bulletin of the Kumamoto Prefecture Fisheries Experimental Station), (1938): 63-65

267. Idem 1957: Asari, hamaguri (The Japanese short-necked clam and hard clam) Senkai yoshoku no riron to jissai (Theory and practise of shallow-sea cultivation), 91-102, Gyoson Bunka Kyokai Hen (Edited by the Fishing Village Cultural Association)

(A concrete and concise summary of the propagation of the Japanese short-necked clam, particularly the protection of seedlings, tilling of the propagation grounds, ground laying and the steps up to seeding of the seedlings, this is an important guide for this field.)

268. KURODA, Tokubei, 1947: Asari ko (Tosha) (A study on the Japanese short-necked clam (Copy)), Yumehamaguri (Callanaitis hiraseana KURODA), (19): 8-9

269. Idem 1948: Asari ni kansuru Keen joshi no kenkai (") (Views of Madame Keen on the Japanese short-necked clam (Copy)), Ibid., (29): 9-11

270. Idem 1961: Mehachibu Showa doteiroku (A not quite complete identification list of the Showa era), Kaizatsu (Shellfish Journal), 21 (4): 369

271. KUSANO, Nobuo, 1943: Shokumotsu chudoku no byori - asari chudoku o chushin to shite (Pathology of food poisoning - focusing on Japanese short-necked clam poisoning), Nihon Iji Shinpo (Japanese Medical News Report), 178:

272. KUSANO, Nobuo, et al. 1943: Arai-cho ni okeru asari chudoku no byori - asari ni yoru kyusei oshoku kan ishukusho (Pathology of Japanese short-necked clam poisoning in Arai Town - acute jaundiced liver atrophy due to the Japanese short-necked clam), Jikken Igaku Zasshi (Journal of Experimental Medicine), 27 (8): 777-787

273. MAEKAWA, Kensuke, and Yasushi INOUE 1950: Naikai-san asari no chihoteki keitai heni chosa (Survey on regional morphological variation in Inland Sea-grown Japanese short-necked clams), Yamaguchi Suishi Jiho (Report of the Yamaguchi Prefecture Fisheries Experimental Station), (1950): 43-45

274. MAKI, Yoshio, 1915: Tokyo-wan ni okeru "asari," "bakagai" no yoshoku (Cultivation of the "Japanese short-necked clam" and "round clam" in Tokyo Bay), Suikenshi (Journal of the Fisheries Research Society), 10 (6): 6-34

275. Idem 1915a: Asari, bakagai no hanshoku (Shinchaku hobun ronsetsusho) (Multiplication of the Japanese short-necked clam and round clam (Excerpted from a newly-arrived Japanese language dissertation)), Dozatsu (Zoology Journal), 27 (316): 91-92

276. MAKITA, Kazuo, and Hiroshi TOKIOKA 1959: Ishoku asari seichodo chosa (Survey on growth rate of transplanted Japanese short-necked clams), Osaka Suishi Ho (Bulletin of the Osaka Prefecture Fisheries Experimental Station), (1957): 89-92

277. Mann, R. 1979: The Effect of Temperature on Growth, Physiology and Gametogenesis in the Manila Clam, Tapes philippinarum, Adams et Reeve, 1850. J. Exp. Mar. Biol. Ecol., 38: 121-133

278. MATSUE, Yoshiyuki, 1950: Nimaigai dokuka no genin ni kansuru kenkyu (Kenkyu keika hokoku) (A study on the cause of bivalve toxication (Research progress report)), Suisan Kenkyukai Ho (Bulletin of the Fisheries Research Society), 3: 31-33

279. Idem 1950a: Asari oyobi kaki chudoku no kenkyu (A study on Japanese short-necked clam and oyster poisoning), Monbusho kagaku kenkyuhi kadai Showa nijugo nendo hokokusho (1950 annual report on topics funded for scientific research by the Ministry of Education), 53

280. Idem 1955: Nimaigai dokuka genin ni kansuru kenkyu (Dokugai no dokuka genin narabi ni taisaku no kenkyu) (A study on the cause of bivalve toxication (A study of the cause of toxication of poison shellfish and countermeasures)), Showa nijushichi-nijuku nendo Monbusho kagaku shiken kenkyuhi ni yoru hankenkyu hokokusho (Group research report based on 1952-1954 scientific experimental research funds of the Ministry of Education), 21-35 (20)

281. MATSUE, Yoshiyuki, and Takajiro TACHIBANA 1952: Nimaigai yudokuka genin tankyu oyobi boshi no kenkyu I. Nimaigai no yudokuka genin ni kansuru kenkyu (Studies on exploring the cause and prevention of bivalve toxication I. A study on the cause of the toxication of bivalves), Suisan Kenkyukai Ho (Bulletin of the Fisheries Research Society), 4: 29-37

282. MATSUE, Yoshiyuki, and Yasuo ITAZAWA 1952: Shokuensui ni yoru shiiku - asari ni suna o hakaseru kotsu (Rearing by saline solution - the trick to make the Japanese short-necked clam expel sand), Sai to Shi (Collecting and Raising), 14 (8): 234-238

(① Japanese short-necked clams are difficult to rear on saline solution alone. ② To raise Japanese short-necked clams on saline solution, either include at least 2% or more of natural seawater or keep the saline solution on the low side as much as possible relative to the

quantity of Japanese short-necked clams. ③ To make the Japanese short-necked clams expel sand, it is best to use 1 sho* of saline solution for 2 sho of Japanese short-necked clams and add to that at least around 2 shaku** of natural seawater. ④ For the saline solution (25 g to 1 L of water), not refined salt but coarse salt is advisable.)

283. MATSUE, Yoshiyuki, and Kazuo SANO 1955: Seisokuchi no kankyo ni yoru asari no kaigara no kokuhen ni tsuite (On the blackening of the shell of the Japanese short-necked clam due to the environment of the habitat), Suisan Zoshoku (Fisheries Propagation), 2 (3/4): 12-19

(The blackening of the shell of the Japanese short-necked clam has been experimentally confirmed to occur when the iron contained in the periostracal chitinous layer of the shell combines with the hydrogen sulfide generated during a state of reduction of the sea-bottom and forms iron sulfide which causes blackening. The reason that the blackening does not extend to the nacre is because it does not contain iron.)

284. Mie-ken Suisan Shijo (Mie Prefecture Fisheries Experimental Station) 1900: Seishoku kisetsu chosa (Survey of reproductive season), Mie Suishi Jiho (Report of the Mie Prefecture Fisheries Experimental Station), (1900): 75-103

285. Idem 1932: Juyo gyokai sorui no sanranki hyo (Spawning season table for important fish, shellfish and algae), Mie Suishi Jiho (Review of the Mie Prefecture Fisheries Experimental Station), 28: 278-580

286. MIGITA, Masao, and Koichi KAMINA 1955: Kai dokuka no kagakuteki kenkyu (Dokugai no dokuka genin narabi ni taisaku no kenkyu) (A chemical study on shellfish toxication (A study on the cause of toxication of poison shellfish

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* Translator's note: A Japanese measure of capacity, 1 sho = 1.805 L

** Translator's note: A Japanese measure of capacity equalling 1/100 sho, 1 shaku = 0.018 L

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and countermeasures)), Showa nijushichi-nijuku nendo kakenhi ni yoru hankenkyu hokokusho (Group research report based on 1952-1954 scientific experimental research funds), 37-46

287. MIGITA, Masao, Koichi KAMINA and Ayako ISHINO 1956: Yukisan oyobi enki ni yoru kaidoku kyuchaku seisei no kokoromi (Experiments on adsorption purification of shellfish poison by organic acid and base), Nissuishi (Journal of the Fisheries Society of Japan), 22 (7): 424-428

288. MIGITA, Masao, and Koichi KAMINA 1957: Hamana-ko ni okeru kai dokuka no genin ni tsuite Dai-ippo Kai no jinkoteki dokuka no kokoromi (On the cause of shellfish toxication in Lake Hamana. Report No. 1. Experiments on artificial toxication of shellfish), Ibid., 23 (4): 215-221

289. Idem 1958: Mukien ni yoru asari doku no henshitsu (Degeneration of Japanese short-necked clam poison by inorganic salt), Ibid., 24 (5): 363-369

290. MIYAJI, Densaburo, 1953: Higata seibutsu ni mirareru Succession, Reaction, Coaction nado ni tsuite (Higata seibutsu no seitai ni kansuru shomondai shudankai kiji) (On the succession, reaction, coaction and such seen in tideland organisms (Proceedings of a group discussion on various issues concerning the ecology of tideland organisms)), Ibid., 18 (12): 743-745

291. MIYAKE, Masato, 1952: Kai yori mukimi no ryosan ni kansuru kenkyu (Dai-ippo) Kagakuteki mukimi saishuho ni kansuru kisoteki kenkyu - I (Studies on mass production of shucked meat from shellfish (Report No. 1) Basic studies on a chemical method of extracting shucked meat - I), Nissuishi (Journal of the Fisheries Society of Japan), 18 (5): 208-211

(Using Japanese short-necked clams, the conditions for a chemical shucked meat processing method and manufacturing process have been outlined. ① No complicated human handling is required. ② Mass processing can be done. ③ No fuel is needed. ④ The whole form is preserved and the shape is lovely. ⑤ There is little loss of the taste-producing

components. ⑥ The enzymes survive so that subsequent processing is helped. Also, searching for chemicals capable of separating the adductor muscles from the shell, they have been identified to be alkali, certain alkaline weak acid salts, ammonium nitrate, trichloroacetic borate and dilute sulfuric acid. Furthermore, based on past research concerning the connective mechanism between the shell and adductor muscles, the action mechanism of chemicals has been discussed.)

292. Idem 1952a: Kai yori mukimi no ryosan ni kansuru kenkyu (Dai-niho) Kagakuteki mukimi saishuho ni kansuru kisoteki kenkyu - II (Studies on mass production of shucked meat from shellfish (Report No. 2) Basic studies on a chemical method of extracting shucked meat - II), Nissuishi (Journal of the Fisheries Society of Japan), 18 (5): 213-216

293. Idem 1953: Kai yori mukimi no ryosan ni kansuru kenkyu - III. Kagakuteki mukimi saishuho no kairyo oyobi koon shori kaikakuho ni tsuite (Studies on mass production of shucked meat from shellfish - III. On improvement of a chemical method of extracting shucked mean and a method of shell-opening by high-temperature treatment), Ibid., 18 (8): 373-378

294. Idem 1953a: Nimaigai no kanetsu ni yoru kaikaku kiko (Shell-opening mechanism by heating of bivalves), Kyudai Nogakubu Gakugei Zasshi (Arts and Science Journal of the Agricultural Faculty, Kyushu University), 14 (2): 279-283 (21)

(The change in the shell-opening pattern when heated at 50 - 120° C was examined with respect to the Japanese short-necked clam, corbicula, ark shell and such. ① The separation of the adductor muscles by heating occurs in the Japanese short-necked clam and such in the order of the transverse striated muscle of the anterior adductor → transverse striated muscle of the posterior adductor → smooth muscle of the anterior adductor → smooth muscle of the posterior adductor. ② The shell-opening

by the normal boiling method is not due to a true adductor separation but a forced separation by the ligament. The separation which occurs by the adductor itself and not due to the ligament first occurs at 120° C.)

295. Idem 1953b: Nimaigai no kaiheikaku undo ni kansuru seirigakuteki kenkyu (Dai-ippo) Ondo no eikyo (Sono ichi) (Physiological studies on the shell opening and closing behavior of bivalves (Report No. 1) Effect of temperature (Part 1)), Ibid., 14 (2): 285-295

296. Idem 1953c: Idem (Dai-niho) Ethyl alcohol ni taisuru hanno ((Report No. 2) Reaction to ethyl alcohol), Ibid., 14 (2): 297-300

297. MIYAZAKI, Ichiro, 1934: Asari no hassei ni tsuite (On the development of the Japanese short-necked clam), Suisan Gakkai Ho (Bulletin of the Fisheries Society), 6 (2): 71-75

(The early stage development of the Japanese short-necked clam, from fertilization through fetus development until the D-form veliger larval stage has been graphically described in detail.)

298. Idem 1936: Asari (Hosan nimaigai no hassei - II. Toku ni yuei shikai no satei ni tsuite IX.) (The Japanese short-necked clam (Development of domestically grown bivalves - II. An assessment of the free-swimming young in particular IX.)), Suisan Koshujo Kenkyu Hokoku (Research Bulletin of the Fisheries Institute), 31 (2): 44-45

(The latter stage development of the Japanese short-necked clam, from the latter part of the D-form veliger stage until the benthic spat stage, as well as the fission of the ovarian eggs during egg-discharge and such supplement the earlier study ('34).)

299. Idem 1957: Nimaigai no sanran, hassei oyobi shikai no shusei ni tsuite (On the spawning and birth of bivalves and the habits of the young), Suisangaku Shusei (Compilation on Fisheries Science), 433-443

300. Idem 1957a: Asari (The Japanese short-necked clam). Nimaigai to Sono Yoshoku (Bivalves and Their Cultivation), 55-59. Isana Books

301. MOMOYAMA, Kazuo, and Tetsuji IWAMOTO 1979: Yamaguchi, Oumi-wan ni okeru asari no sanranki ni tsuite (On the spawning season of the Japanese short-necked clam in Yamaguchi and Oumi Bays), Yamaguchi Naikai Suishi Hokoku (Bulletin of the Yamaguchi Prefecture Inland Sea Fisheries Experimental Station), (7): 19-34

(In order to deduce the spawning season of the Japanese short-necked clam in Yamaguchi and Oumi Bays, histological observations of corpulence, ♀♂ discriminability rate and the gonads and surveys of the free-swimming larvae were conducted. ① The peak spawning season in terms of corpulence coincides with the period it goes from maximum to minimum, and in terms of ♀♂ discriminability rate coincides with the period it becomes generally maximal. ② The peak spawning season in both bays was deduced to be April - May in the spring and mid-September - early November in the autumn. ③ In those individuals infested by numerous parasites the development of the gonads was extremely poor. ④ As an adjunct to the spawning calendar for the Japanese short-necked clam in each prefecture, this constitutes important material in this area.)

302. MORI, Isamu, 1953: Sensuikai ni okeru yoshoku jiban no kotei ni yoru asari no seicho ni tsuite (On the growth of the Japanese short-necked clam depending on the unevenness of the cultivation ground base in artificial sea ponds), Nagasaki Suishi Jiho (Report of the Nagasaki Prefecture Fisheries Experimental Station), (1950): 68-72

303. MORI, Takajiro, and Yoshiro HASHIMOTO 1950: Nimaigai doku no kagakuteki kenkyu (A chemical study on bivalve poisons), Suisan Kenkyukai Ho (Bulletin of the Fisheries Research Society), 3: 31-33

304. MURASE, Katsuko, 1944: Asari no kara no sokuteigakuteki kenkyu (A metrological study of the shell of the Japanese short-necked clam), Dozatsu (Zoology Journal), 59 (4-6): 42-46

305. MUSASHI, Sekiju, 1833: Asarigai (Kohorui rokujukyu shu) (The Japanese short-necked clam (Sixty-nine species of hard clams)), Mehachibu, Volume 1

306. NAGAMINE, Chiyama, 1930: Gaiteki ni yoru yoshoku kairui no higai to sono shokugai shiken (Damage to cultivated shellfish by noxious enemies and experiments on their predation), Chiba Suishi Naiwan Bunjo Kio Jiho (Retrospective Report of the Chiba Prefecture Fisheries Experimental Station Inner Bay Substation), (1930): 37-41

307. NAGASAKI, Giichi, 1957: Asari no seichodo ni tsuite (On the growth rate of the Japanese short-necked clam), Kanagawa Suishi Jiho (Report of the Kanagawa Prefecture Fisheries Experimental Station), (1955): 96-107

308. Nagasaki-ken (Nagasaki Prefecture) 1961: Asari chigai no makitsuke (Seeding of Japanese short-necked clam spats), Engan gyogyo no tebiki (Bessatsu) Gyogyo gijutsu kairyo (A guide to coastal fisheries (Supplement) Fisheries technique improvement), 49

309. NAITO, Shingo, 1930: Shuyo kairui no sanran jiki chosa (Survey of the spawning season of principal shellfish), Chiba Suishi Naiwan Bunjo Kio Jiho (Retrospective Report of the Chiba Prefecture Fisheries Experimental Station Inner Bay Substation), (1930): 21-23

310. Idem 1931: Asari hamaguri no seichodo (Growth rate of the Japanese short-necked clam and hard clam), Ibid., (1931): 10-20

311. Idem 1938: Asari chigai hassei chosa (Survey on the birth of Japanese short-necked clam spats), Ibid., (1935-1936): 3-13

312. NAKAKAMIKAWA, Shorokuro, 1941: Asarirui no shikisai (Zatsuroku) (22)
(The colouration of Japanese short-necked clams (Miscellaneous notes)), Kaizatsu (Shellfish Journal), 11 (1): 36

313. NAKAMURA, Makoto, 1977: Kairui zoshoku ni kansuru kogakuteki kenkyu (An engineering study on shellfish propagation), Suisan Doboku (Fisheries Civil Engineering), 14 (1): 7-18

(Taking the Japanese short-necked clam as an example, the dispersion of the free-swimming larvae of bivalves, the natural decrease, environmental factors and such have been analyzed by engineering techniques, and the desirable environmental factors and suppression of the decremental factors and such have been explicitly discussed using numerical equations.)

314. Idem 1979: Higataiki ni seisoku suru kai yosei no bunsan (Fuyu yosei no bunsan) (Dispersion of shellfish larvae living in the tideland region (Dispersion of free-swimming larvae)), Suisan Dobokugaku - Gyojo Zosei, Kaiyo Kankyo Engineering (Fisheries Civil Engineering - Fishing Ground Construction and Oceanic Environment Engineering), 244-251, INA Industry, Jiji Press, Tokyo

(Taking the Japanese short-necked clam and hard clam as representatives of the shellfish in tideland regions and similarly Meretrix lamarckii DESHAYES and Gomphina (Macridiscus) melanaegis ROEMER as representatives of the shellfish in wave-pounding zones, the dispersion of the larvae, natural decrement and settlement of each have been analyzed by engineering techniques and the methodology for initial resource level estimation has been touched upon.)

315. Idem 1979a: Kankyo yoin tekishutsuho (Seibutsu to kankyo) (Method of identifying the environmental prerequisites (Organisms and environment)), Ibid., 255-257

(From among the combination of the many factors that make up the bio-environment, the method to determine the optimum environment, learn the factors exerting a dominant effect on the organisms and evaluate them properly has been discussed.)

316. Idem 1979b: Asari no seisoku kankyo joken (Seibutsu to umi no kankyo) (Habitational environmental conditions for the Japanese short-necked clam (Organisms and the sea environment)), Suisan Dobokugaku - Gyojo Zosei,

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Kaiyo Kankyo Engineering (Fisheries Civil Engineering - Fishing Ground Construction and Oceanic Environment Engineering), 264-266, INA Industry, Jiji Press, Tokyo

(The habitational environment of the Japanese short-necked clam has been analyzed using factor identification method, according to which the following are claimed. ① In terms of bottom matter, sand or sand and shell zones are good, and it is better if the mud portion is low. ② A littoral where the water depth is medium or less, that is, the water depth at high spring tide is 2 - 5 m or less (DL, 2.5 - 0.5 m); ③ the carbon level C is medium (1.5% or less); ④ the nitrogen N is 0.1% or less; and ⑤ the chlorine level Cl is medium (17%) or less, is good.)

317. NAKAMURA, Churoku, 1940: Kuchibagai oyobi asari no kukichu ni okeru seikatsuryoku ni tsuite (On the vitality of Caecella chinensis DESHAYES and Japanese short-necked clam in air), Nissuishi (Journal of the Fisheries Society of Japan), 8 (6): 367-372

318. NAKANISHI, Sutekichi, and Isao FUKATSU 1965: Showa sanjuku nen asari hogo suimen chosa hokoku (1964 survey report of Japanese short-necked clam protected waters), 1-6, Mie Suishi Ise-wan Bunjo (Mie Prefecture Fisheries Experimental Station Ise Bay Substation)

319. NAKAYOSHI, Chosuke, 1934: Asari chigai hassei chosa (Survey on the birth of Japanese short-necked clam spats), Saga Suishi Jiho (Report of the Saga Prefecture Fisheries Experimental Station), (1934): 64-66

320. Idem 1934a: Asari chogai boshi shiken (Experiments on prevention of bird damage to the Japanese short-necked clam), Ibid., (same year): 66-68

321. NAKAJIMA,* Masao, 1955: Dokugai no chuchosen (kanzo) kara bunri sareta kobo ni yoru mouse no byohen (Dokugai no dokuka genin narabi ni taisaku

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* Translator's note: "NAKAJIMA" is more conventional spelling than "NAKAZIMA"

no kenkyu) (Pathological changes in mice due to yeast isolated from the middle intestinal gland (liver) of poison shellfish (A study of the cause of toxication of poison shellfish and countermeasures)), *Showa nijushichi-nijuku nendo Monbusho kagaku shiken kenkyuhi ni yoru hankenkyu hokokusho* (Group research report based on 1952-1954 scientific experimental research funds of the Ministry of Education), 57-72

322. Idem 1955a: *Asari oyobi kaki no dokuka ni kansuru kenkyu* *(Nihon dobutsuso no kenkyu)* (A study on the toxication of the Japanese short-necked clam and oyster (A study of Japanese fauna)), *Nihon Seibutsu Chiri Gakkai Kaiho* (Bulletin of the Biogeographical Society of Japan), 16-19: 84-87

323. Nakazima, M. 1965: Studies on the Source of Shellfish Poison in Lake Hamana - I. Relation of the Abundance of a Species of Dinoflagellate *Prorocentrum* sp. to Shellfish Toxicity. *Nissuishi* (Journal of the Fisheries Society of Japan), 31 (3): 198-203

324. Idem 1965a: Studies on the Source of Shellfish Poison in Lake Hamana - II. Shellfish Toxicity during the "Red-tide." Ibid., 31 (3): 204-207

325. Idem 1965b: Idem - III. Poisonous Effects of Shellfishes Feeding on *Prorocentrum* sp. Ibid., 31 (4): 281-285

326. Idem 1968: Idem - IV. Identification and Collection of the noxious Dinoflagellate. Ibid., (2): 130-132

327. Idem 19 ? : Idem - V. Cultures of *Exuviaella marie-lebouriae*. (23)
Commemorative publication in memory of Mr. Masao NAKAJIMA

328. Idem 19 ? a: Idem - VI. Toxicities of the Shellfish and *Exuviaella mariae-lebouriae*. Ibid.

329. Neave, F. 1949: The Spread of the Japanese Little-neck Clam in British Columbia waters. Fish. Res. Board Can. Pac. Prog. Rep., 61: 3 p.

330. Nihon Suisan Shigen Hogo Kyokai (Fisheries Resource Protection Association of Japan) 1981: *Asari Tapes (Ruditapes) philippinarum (Adams & Reeve)*

(The Japanese short-necked clam Tapes (Ruditapes) philippinarum (Adams & Reeve)), Suisei Seibutsu Seitai Shiryo (Ecological Data on Aquatic Organisms)

331. NIINO, Hiroshi, 1949: Chigai seiikuchi ni okeru zoshoku chosa kenkyu, higata ni okeru chikasui yushutsu chiten shuhen no tokusei ni tsuite (Sono ichi, suion oyobi doon ni oyobosu eikyo) (Survey study on propagation in spat breeding grounds. On the characteristics around underground water spouting points in tidelands (Part 1. Effect on water temperature and soil temperature)), Suisan Kenkyukai Ho (Bulletin of the Fisheries Research Society), (2): 64-77

332. NIINO, Hiroshi, and Mishina TOKUHISA 1952: Chikasui riyo ni yoru riko shubyo hogo ikusei kenkyu (Chigai seiikuchi ni okeru tokushu chosa kenkyu (Sono ni, higata ni shikutsu shita jifuni no shuhen ni okeru asari chigai no hatsuiku keika)) (A study on protection and raising of Japanese short-necked clam and hard clam seedlings by utilizing underground water (Special survey study in spat breeding grounds (Part 2. Developmental progress of Japanese short-necked clam spats around a self-gushing well trial-dug in a tideland))), Ibid., (4): 18-28

(The development of Japanese short-necked clam spats can be seen on the Desu coast of Chiba City, but every year shortly after summer they die out. Accordingly, upon digging a self-gushing well in the tideland, within the range to where the effect of the underground water extended, the survival of Japanese short-necked clams was discerned.)

333. NIINO, Hiroshi, 1953: Higata teishitsu no henka to sono taisaku ni kansuru ichikosatsu (Higata seibutsu no seitai ni kansuru shomondai shudankai kiji) (A study on the changes in tideland bottom matter and countermeasures (Proceedings of a group discussion on various issues concerning the ecology of tideland organisms)), Nissuishi (Journal of the Fisheries Society of Japan), 18 (2): 742-743

334. NISHIKAWA, Hiroshi, 1951: Asari no yoshoku mitsudo to seicho oyobi karagata ni kansuru kosatsu (A study on the cultivation density and growth and the shell configuration of the Japanese short-necked clam), Nagasaki Suishi Goto Bunjo Kenkyu Keika Gaiyo Hokoku (Summary Report of Research Progress of the Nagasaki Prefecture Fisheries Experimental Station Goto Substation), (1950-1951): 29-30

335. NISHIKAWA, Hiroshi, Isamu MORI and Shigenori YOSHIDA 1949: Asari chigai makitsukeryo kohaku ni yoru seichodo seisanryoku narabi ni keitaiteki heni ni tsuite (On the growth rate, productivity and morphological variation depending on the seeding density of Japanese short-necked clam spats), Nagasaki Suishi Jiho (Report of the Nagasaki Prefecture Fisheries Experimental Station), (1948-1949): 50-56

336. Idem 1949a: Asari shubyo ishoku shiken (Experiments on Japanese short-necked clam seedling transplantation), Ibid., (same year): 57-60

337. NISHIKAWA, Hiroshi, and Gisuke HISATOMI 1959: Asari no senshokutai (Chromosomes of the Japanese short-necked clam), Dozatsu (Zoology Journal), 68 (8): 279-280

(The chromosome number is 2n = 28 with spermatogonium division and n = 14 with primary and secondary spermatocyte division, while the karyotype is dot-shaped and short rod-shaped.)

338. NISHIKAWA, Hiroshi, Akira UMEDA and Hideo FUKUOKA 1967: Asari ransoran no hattatsu to sane no kodo no kanrensei ni tsuite (On the relationship between the development of ovarian eggs of the Japanese short-necked clam and the behavior of the nucleus), Suidaiko Kengyoseki (Fisheries University Research Results), (5/5): 23-28

339. NISHIMIYA, Toshiaki, 1978: Kai ryori (Shellfish dishes), Gendai Nihon Ryori Zenshu (Complete Collection of Contemporary Japanese Cooking), (3), 207, Shibata Bookstore, Tokyo

(The following recipes for Japanese short-necked clam dishes are presented: ① Japanese short-necked clams with floral dressing; ② Japanese short-necked clams with onion sauce; and ③ Japanese short-necked clams with hand-picked rice-bran yams.)

340. NITTA, Tadao, and Shunsuke NAKAI 1953: Kai, kaiso plankton no chishiryo ni tsuite (On the lethal quantity of shellfish and seaweed plankton), Naikai Suiken Ho (Bulletin of the Inland Sea Regional Fisheries Research Laboratory), (3): 19~

341. NOGUCHI, Hiroshi, and Hideaki KADOMINA 1953: Kaidoku no kenkyu (A study on shellfish poisons), Shizuoka Suishi Jiho (Report of the Shizuoka Prefecture Fisheries Experimental Station), (1950-1951): 88-111

342. Idem 1955: Kai dokuka chitai oyobi sono fukin no kankyo - dokugai no dokuka genin tankyu narabi ni taisaku no kenkyu (Shellfish toxication zones and their nearby environment - a study on exploring the cause of toxication of poison shellfish and countermeasures), Showa nijushichi-nijuku nendo Monbusho kagaku shiken kenkyuhi ni yoru kenkyu kokusho (Research report based on 1952-1954 scientific experimental research funds of the Ministry of Education): 47-56

343. Nomura, E. 1928: On the Relation between Weight and Dimensions in the Bivalves, *Tapes philippinarum* and *Cytheres meretrix*. Sci. Rept. Tohoku Imp. Univ., 3: 113-124

344. OGATA, Toji, 1944: Asari ni kisei suru isshu no yokyuchu no keitai seitai narabi ni sono hatsuikushi ni tsuite (On the morphology and ecology of one species of sucking larvae parasitic on the Japanese short-necked clam and its growth history), Dozatsu (Zoology Journal), 56 (4-5-6): 37-41 (24)

(The morphology and growth history of one species of sucking insect, *Gymnophallus? burricola*, parasitic on Tokyo Bay-grown Japanese short-necked clams were examined. They are parasitic on virtually 100% of the

Japanese short-necked clams grown in the said location, and an average of 12,266 insects are said to be parasitic on each individual.)

345. OGAWA, Kosaburo, 1984: Oumi-wan ni okeru asari zoshokujo no zosei to kanri (Ensei enko koza ⑧) (Construction and management of Japanese short-necked clam propagation grounds in Oumi Bay (Coastal maintenance and coastal structure lecture series ⑧)), Suisan no Kenkyu (Research on Fisheries), 3 (1): 102-104

346. OHBA, Shigeru, 1956: Asari shizen shudan no seitai (Koen yoshi) (Ecology of natural population of Japanese short-necked clams (Gist of lecture)), Dozatsu (Zoology Journal), 65 (3/4): 118

(The number of individuals in the Japanese short-necked clam population in the tideland of Moto Island in the Shiaku Islands becomes maximal ($2000 - 3000/m^2$) around June - July and minimal ($500/m^2$) around April. This means that, of the two spawnings in the spring and fall, only those produced in the spring form the actual population. Looking also at the gross weight, hand in hand with the growth of the spring-born Japanese short-necked clams, it becomes maximal ($2 - 3$ kg/m^2) around November. The mortality rate is high in the summer, reaching 10 - 30% every month, but low in winter, with the size of the population virtually not changing. The total population can be divided into population groups by age on the basis of shell length, shell width/shell length, shell width/shell height and weight, but those generally up to 2 years comprise almost all. Looking at their change in average shell length and average weight, they grow tremendously in the May - November period and virtually not at all in winter.)

347. Ohba, S. 1956: Effects of Population Density on Mortality and Growth in an Experimental Culture of a Bivalve, Venerupis semidecussata. Biol. Jour. Okayama Univ., 2 (4): 169-173

(Breeding the bivalves for two months in a water tank at six different densities, 10, 30, 100, 200, 500, 1000 individuals/0.1 m^2, the mortality rate and growth rate were compared. The mortality rate rose as the breeding density got higher, indicating 70% at the maximum. In terms of growth, of the three measures of shell length, shell height and shell width, the effect of excessive density is reflected most strongly in the shell length.)

348. Idem 1959: Ecological Studies in the Natural Population of a Clam, Tapes japonica, with Special Reference to Seasonal Variations in the Size and Structure of the Population and to Individual Growth. Biol. Jour. Okayama Univ., 5 (1/2): 13-42

(This is an important paper which examines the ecology of the natural population of the Japanese short-necked clam. For a summary of the contents, see OHBA (1956).)

349. Oita-ken Suisan Shikenjo (Oita Prefecture Fisheries Experimental Station) 1933: Senkai riyo shiken (Riko yoshoku shiken) (Shallow-sea utilization experiments (Japanese short-necked clam and hard clam cultivation experiments)), Oita Suishi Jiho (Report of the Oita Prefecture Fisheries Experimental Station), (1933): 103-105

350. OKA, Shigeki, 1953: Jikkenteki kyusei kan ishukusho no soshiki kagakuteki kenkyu (A histochemical study on experimental acute liver atrophy), Nihon Shokakibyo Gakkai Zasshi (Journal of the Gastroenterological Society of Japan), 50 (11)

351. Okayama-ken Suisan Shikenjo (Okayama Prefecture Fisheries Experimental Station) 1925: Asarigai yoshoku shiken (Japanese short-necked clam cultivation experiments), Okayama Suishi Gyoho (Report on Operations of the Okayama Prefecture Fisheries Experimental Station), (1925): 108

352. Idem 1929: Idem, Ibid., (1929): 59-60

353. Idem 1930: Idem, Ibid., (1930): 74

354. Idem 1931: Idem, Ibid., (1931): 111

355. Idem 1932: Idem, Ibid., (1932): 130-135

356. Okayama-ken Suisan Shikenjo Tamashima Shisho (Okayama Prefecture Fisheries Experimental Station Tamashima Substation) 1951: *Asari chigai no chinchaku ni tsuite* (On the settlement of Japanese short-necked clam spats), *Okayama Suishi Tamashima Shisho Hokoku* (Bulletin of the Okayama Prefecture Fisheries Experimental Station Tamashima Substation): 1-4

357. OKUBO, Masao, 1967: *Asari ni tsuite TLm sokuteiho no kento* (A study of TLm measurement methods with respect to the Japanese short-necked clam), *Suisan Zoshoku* (Fisheries Propagation), 15 (3): 55-62 (25)

(With respect to TLm measurement in Japanese short-necked clams, a comparative study was done of such methods as ① directly in a vessel not lined with sand, ② when ruptures were made on the shells of tested clams using the same method, ③ when they were allowed to burrow into sand, and ④ others. As a result, it was thought best to determine the TLm for 96 - 120 hours at 20° C with normal shells without laying any sand.)

358. OKUBO, Masao, and Takako OKUBO 1965: *Asari ni taisuru enbun teika no eikyo to PCP no dokusei* (The effect of salinity decrease on the Japanese short-necked clam and the toxicity of PCP), *Tokai-ku Suiken Ho* (Bulletin of the Tokai Regional Fisheries Research Laboratory), (44): 31

359. OKUTANI, Takashi, 1980: *Asari* *(Umi no kai gojisshu)* (The Japanese short-necked clam (Fifty species of shellfish of the sea)), *Green Books*, 60: 94-95, New Science Co., Tokyo

(The characteristics, distribution and ecology of the Japanese short-necked clam have been concisely introduced. ① With Japanese short-necked clams of 2 cm or under no effect of density up to 10 - 40 individuals/m^2 can be seen, but with those of 3 cm or above a significant effect of dense cultivation shows up. ② Life history: spawning occurs twice, in the spring and fall, and the free-swimming larvae enter benthic life at 200 - 230 μ. Spat settlements of 500,000 individuals/m^2 or more are sometimes seen, and up to a shell length of 3 cm they secrete byssus threads and attach to sand grains.)

360. OSHIMA, Hiroshi, 1927: Asari no ashiito (Zatsuroku) (Byssus threads of the Japanese short-necked clam (Miscellaneous notes)), Dozatsu (Zoology Journal), 39 (467): 375-376

361. Idem 1927a: Asari ni kisei suru umigumo ni tsuite (Dai-niho) (Shoroku) (On a sea spider parasitic on the Japanese short-necked clam (Report No. 2) (Excerpts)), Dozatsu (Zoology Journal), 39 (469-470): 487-488

(A species of sea spider, Nymphonella tapetis, is parasitic on many of the Japanese short-necked clams of Aratsu in Hakata Bay. The rate of parasitism varies by season but averages 33 - 34%, with the number of parasites in high cases being 8 individuals/clam but averaging 2 individuals/clam. The parasitism begins in March, peaks in April reaching 45%, and diminishes in May.)

362. OSHIMA, Yasuo, 1953: Asari no ido ni kanshite (Higata no seitai ni kansuru shomondai shudankai kiji) (On the movement of the Japanese short-necked clam (Proceedings of a group discussion on various issues concerning the ecology of tidelands)), Nissuishi (Journal of the Fisheries Society of Japan), 18: 741-742

363. OSHIMA, Yasuo, et al. 1955: Higata no koun koka ni kansuru shiken (Experiments on the effectiveness of tilling of tidelands), Senkai naiwan zoshoku jigyo oyobi dojigyo koka chosa hokokusho (Survey report on shallow-sea inner bay propagation project and said project effectiveness), (1953-1954): 82-119

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364. OSHIMA, Yoichi, et al. 1931: Asari (asari) (The Japanese short-necked clam), Saishin Yogai Tokuhon (An Up-to-date Shellfish Cultivation Reader), pages 36-51, Sugiyama Bookstore

(While somewhat old, the cultivation of the Japanese short-necked clam overall has been pertinently summarized, amply serving as a reference. The contents deal with the morphology and habits, yield and distribution, birth of spats, selection of propagation grounds and method of propagation, noxious enemies, harvest season and harvesting method.)

365. OTANI, Takeo, and Chinkichi HAGINO 1949: Kairui no kagakuteki kenkyu Dai-ippo (A chemical study of shellfish. Report No. 1), Nissuishi (Journal of the Fisheries Society of Japan), 15 (3): 134-136

366. Quayle, D.B. 1960: The Intertidal Bivalves of British Columbia. Br. Columbia Prov. Mus. Handb., 17: 104 p.

367. Idem 1964: Distribution of introduced marine Mollusca in British Columbia Waters. J. Fish. Res. Board Canada, 21: 1155-1181

368. Quayle, D.B. & N. Bourne 1972: The Clam Fisheries of British Columbia. Fish. Res. Board Canada, Bull., 179: 70 p.

369. SAEKI, Kiyoko, and Hiroshi KUMAGAI 1980: Asari no ippan seibun oyobi muki seibun no kisetsuteki hendo (Seasonal variation in general components and inorganic components of the Japanese short-necked clam), Nissuishi (Journal of the Fisheries Society of Japan), 43 (3): 341-344

370. Saga-ken Suisan Shikenjo (Saga Prefecture Fisheries Experimental Station) 1918: Asari saibyo shiken (Experiments on Japanese short-necked clam seedling collection), Saga Suishi Jiho (Report of the Saga Prefecture Fisheries Experimental Station), (1918)

371. Idem 1919: Idem, Ibid., (1919)

372. Idem 1920: Idem, Ibid., (1920) (26)

373. Idem 1921: Idem, Ibid., (1921)

374. Idem 1922: Idem, Ibid., (1922)

375. Idem 1926: Asari-doko ni taisuru kamo higai boshi shiken (Experiments on prevention of duck damage to Japanese short-necked clam beds), Saga Suishi Kansui Yoshokubu Jiho (Report of the Saga Prefecture Fisheries Experimental Station Salt-water Cultivation Division), (1926): 28

376. Idem 1928: Asarigai saibyo shiken (Juyo kairui yoshoku shiken) (Experiments on Japanese short-necked clam seedling collection (Experiments on important shellfish cultivation)), Saga Suishi Gyoho (Report on Operations of the Saga Prefecture Fisheries Experimental Station), (1928): 73-75

377. Idem 1939: Asari-doko teishitsu kairyo shiken (Experiments on improvement of bottom matter of Japanese short-necked clam beds), Saga Suishi Kansui Yoshokubu Jiho (Report of the Saga Prefecture Fisheries Experimental Station Salt-water Cultivation Division), (1939): 20-22

377a. Idem 1939: Asari fudei teiko shiken (Experiments on resistance of the Japanese short-necked clam to floating mud), Ibid., (same year): 22-23

377b. Idem 1950: Asari jinko saibyo shiken (Experiments on Japanese short-necked clam artificial seedling collection), Saga Suishi Gyoho (Report on Operations of the Saga Prefecture Fisheries Experimental Station), (1950): 232-233

377c. Idem 1951: Asari no hassei seiiku ni tomonau budomari no henka chosa (Survey on changes in yield with the development and growth of the Japanese short-necked clam), Ibid., (1951): 156-164

378. Idem 1952: Asari zoshoku o mokuteki to shita higata kyakudo no koka nintei shiken (Experiments on ascertaining the effect of resoiling tidelands aimed at Japanese short-necked clam propagation), Saga Suishi Gyoho (Report of Operations of the Saga Prefecture Fisheries Experimental Station), (1952)

379. Idem 1954: Asari fuyu shigai no shutsugen ni tsuite (Hogo suimen kanrigyo ni tomonau chosa) (On the emergence of free-swimming young of the Japanese short-necked clam (Survey associated with the protected waters management business)), Saga Suishi Jiho (Report of the Saga Prefecture Fisheries Experimental Station), (1954): 191-198

380. SAGARA, Junichiro, 1952: Himeasari to asari no sai ni tsuite (On the difference between Tapes (Amygdala) variegata (SOWERBY) and the Japanese short-necked clam), Nissuishi (Journal of the Fisheries Society of Japan), 18 (3): 133-134

(Comparing the morphology of the Japanese short-necked clam and Tapes (Amygdala) variegata (SOWERBY), the following results were obtained:

		Japanese short-necked clam	Tapes (Amygdala) variegata (SOWERBY)
Mantle embayment		Deep	Shallow
Siphon	Length	1.5 times shell length	Approximately 1/3 of shell length
	Shape	Both siphons united but branched at tip	Branched at base
	Feeler (Inhalant siphon)	Simple with no process; not branched	Complex with process; not branched
Sperm		Head horn-shaped	Head chestnut-shaped

381. Idem 1952a: Asari, hamaguri no seisoku mitsudo to seicho no kankei narabi ni sogokan no eikyo ni tsuite (On the relationship and mutual effect between the habitational density and growth of the Japanese short-necked clam and hard clam), Ibid., 18 (6): 249-262

382. Idem 1956: Asari seishokusen no ijorei (Cases of abnormality in the gonads of the Japanese short-necked clam), Suisan Zoshoku (Fisheries Propagation), 4 (2): 57-58

(Japanese short-necked clams are usually ♀♂ differentiated, but exhibit a histological structure of accidental ⚥ hermaphroditism.)

383. Idem 1958: NH_4OH ni yoru nimaigai no sanran yuhatsu (Inducement of spawning of bivalves by NH_4OH), Nissuishi (Journal of the Fisheries Society of Japan), 23 (9): 505-510

(If 2 cc of NH_4OH solution are injected into the gonads of Japanese short-necked clams in the spawning season, egg discharge and sperm discharge occur, and artificial fertilization by this mean is possible, with normal development occurring.)

384. Idem 1970: Kairui no tennen saibyo ni kansuru shian (Draft proposal on collection of natural seedlings of shellfish), Nimaigai Zoyoshoku Kenkyukai Ho (Bulletin of the Bivalve Propagation and Cultivation Research Society), (1): 11-12

385. Idem 1970a: Nama odei no asari, Chosen hamaguri oyobi magaki no kakushu chigai ni taisuru seicho koka ni tsuite (On the effect of raw sludge on the growth of various spats of the Japanese short-necked clam, *Meretrix lamarckii* DESHAYES and *Crassostrea gigas* (THUNBERG)), Tokai-ku Suiken Gyoseki (Results of the Tokai Regional Fisheries Research Laboratory), E15: 17-23

386. Idem 1973: Fusokurui seikatsushi kenkyu ni kansuru mondaiten - yosei no seitaigaku (Issues concerning research on the life history of Pelecypoda - ecology of larvae), Kaiyo Kagaku (Oceanic Science), 5 (3): 48-52

(Existing knowledge on the larval ecology of useful Japanese-grown bivalves has been summarized. In particular, there are detailed descriptions on the conditions of settlement and attachment of the larvae, which should serve as a good reference for the collection of seedlings of the Japanese short-necked clam and oyster and such. (27)
The main contents deal with the attachment period of metamorphic stage larvae and the size at settlement and attachment, the optimum temperature for the development of fertilized eggs and D-shaped larvae, the optimum

specific gravity, and the effect of turbidity on the development of fertilized eggs and growth of larvae.)

387. Idem 1977: Kairui no zoyoshoku ni okeru higata no riyo ni tsuite (On the utilization of tidelands in the propagation and cultivation of shellfish), Suisan Doboku (Fisheries Civil Engineering), 13 (2): 17-20

(The life of useful shellfish living in tidelands such as the Japanese short-necked clam and hard clam and the environment of the tidelands have been summarized. The contents deal with the species of shellfish that would be the object of propagation and cultivation, their life history, development conditions (dry exposure time, temperature of tideland and collected water, floating soil) and rearing conditions in the tidelands, in addition to which tables have also been presented comparing the spawning season of shellfish in the tidelands, the optimum temperature for the development of larvae, their free-swimming period and size at settlement, etc.)

388. Idem 1981: Asari, hamaguri no seiri seitai (Physioecology of the Japanese short-necked clam and hard clam), Kaiyo to Seibutsu (Ocean and Organisms), 13, 3 (2): 102-105

(Existing knowledge on the physioecology which constitutes the foundation of the propagation and cultivation of the Japanese short-necked clam and hard clam has been concisely summarized. This should be a good reference for informational advisors in this field. The contents deal with the relationship of recent trends in production and changes in fishing grounds at various places, the spawning season, movement and environmental factors.)

389. Idem (Editorially supervised by OSHIMA, HANAOKA et al.) 1965: Asari (The Japanese short-necked clam), Senkai Zoshoku Rokujisshu (Sixty Species for Shallow-sea Propagation), 219-227, Daisei Publishing, Higashihara

(The propagation of the Japanese short-necked clam has been pertinently summarized based on comparatively new data, providing a good guide. The contents deal with morphology, distribution, ecology, environmental conditions, habitat, propagation method, fishing ground construction, channel making, ground laying, slow-flowing seedling collection, tilling, resoiling, underground water utilization, protected waters, artificial seedling production, transplantation, management, etc.)

390. SAGARA, Junichiro, and Masaaki TSUKISE 1958: Nimaigai no kankyo yoso to shite no vitamin B_{12} - 1. Asari, hamaguri no seisoku kankyo oyobi jiki ni yoru vitamin B_{12} ganryo no sai (Vitamin B_{12} as an essential environmental element for bivalves - 1. Differences in vitamin B_{12} content in the Japanese short-necked clam and hard clam depending on the habitational environment and season), Nissuishi (Journal of the Fisheries Society of Japan), 24 (6/7): 456-461

(① Both the Japanese short-necked clam and hard clam contain much B_{12} in the spawning season and little after spawning when the gonads are little. ② The content is higher in those living in the offing than on the coast, and more is contained in those that are suspended than those that are bottom dwellers. ③ The amount of B_{12} in bottom matter is also higher in the offing than on the coast, and in the bottom matter in the offing it is high in the surface and middle layers and low in the bottom layer. Also, it is higher in plant plankton than in animal plankton.)

391. SAGARA, Junichiro, 1983: Asari zoshoku no hanashi (Nos. 1 - 12) (The story of Japanese short-necked clam propagation (Nos. 1 - 12)), Nori Times (Laver Times), 1983/V/1 - 1983/VIII/21

392. Idem 1983a: Asari no zoshoku (Junkai kyoshitsu shiryo II) (Propagation of the Japanese short-necked clam (Touring classroom data II)), Nihon Suisan Shigen Hogo Kyokai Geppo (Monthly Bulletin of the Fisheries Resource Protection Association of Japan), (234): 10-17

393. SAGARA, Junichiro, Ryonosuke KITAMORI and Kiyoshi ARAKAWA 1970: Nama odei no taiseki ni yoru seibutsuso no henka (tokuni asari o chushin to shite) (Gesui odei no kaiyo kangen ni kansuru kenkyu) (Changes in the biophase due to the accumulation of raw sludge (especially focusing on the Japanese short-necked clam) (Studies on oceanic restoration of sewage sludge)), Tokai Suiken Gyoseki (Results of the Tokai Regional Fisheries Research Laboratory), No. E15

394. SAI, So (TSUI, Hsiang) 1963: Asari no ido ni tsuite (On the movement of the Japanese short-necked clam), Suisan Zoshoku (Fisheries Propagation), 11 (1): 13-24

(The methods of movement of the Japanese short-necked clam are: ① advancement by repeating a forward expansion and contraction movement of the foot; ② extending the foot to the side or rear and, using that foot as a fulcrum, pushing the body forward; and ③ using a leaping form of ② and advancing 2 - 3 times the shell length at once. The speed of movement of the larvae is 4.8 - 5.7 m/30 days (sandy material) to 1.4 - 1.5 m/30 days (gravel). With an accumulation of soil and sand, the surfacing time up to the surface layer when the thickness was 10 cm was 5 - 9 hours for both larvae and adults and 12 hours for aged adults, while at 15 cm the larvae and adults took 11 - 12 hours and the aged adults 15 hours. Also, the mortality rate due to burial by soil and sand was 3 - 18% at 10 cm, 37 - 50% at 15 cm and 70 - 100% with aged adults at 20 cm.) (28)

395. SAI, So (TSUI, Hsiang) and Yasuo OSHIMA 1958: Seicho no yokusei sareta asari no ishoku ni yoru seicho to kakukei no henka ni tsuite (On the growth and change in shell shape due to transplantation of Japanese short-necked clams inhibited in growth), Nissuishi (Journal of the Fisheries Society of Japan), 24 (8): 616-619

396. SAITO, Saburo, 1936: *Chiba-ken Edo kawajiri ni okeru kairui yoshoku to chogai ni tsuite* (On shellfish cultivation and bird damage at the Edo River mouth in Chiba Prefecture), *Oyashio* (Kurile Current), 30

397. SAKAI, Ko, 1933: *Nihon-san kakuregani-ka no bunrui* (Classification of the family Pinnotheridae grown in Japan), *Shokubutsu oyobi Dobutsu* (Plants and Animals), 1 (7): 977-984

398. SATO, Senta, 1980: *Matsukawa-ura ni okeru asari to teishitsu to no kankei ni tsuite* *(Kairui yoshoku shiken)* (On the relationship between the Japanese short-necked clam and bottom matter in Matsukawa Inlet (Shellfish cultivation experiments)), *Fukushima Suishi Jiho* (Report of the Fukushima Prefecture Fisheries Experimental Station), (1979): 129

399. SATO, Senta, and Norio YAMAGUCHI 1978: *Asari gyojo kankyo chosa* (Environmental survey of Japanese short-necked clam fishing grounds), Ibid., (1977): 132-134

400. SATO, Senta, Jun OWADA and Norio YAMAGUCHI 1980: *Matsukawa-ura ni okeru asari shigen ni tsuite - I* (On the Japanese short-necked clam resource in Matsukawa Inlet - I), *Fukushima Suishi Kenho* (Research Report of the Fukushima Prefecture Fisheries Experimental Station), (6): 81-87

401. Seikai-ku Suisan Kenkyujo Ariake Shisho, Saga-ken Suisan Shikenjo Ariake Bunjo (Seikai Regional Fisheries Research Laboratory Ariake Branch and Saga Prefecture Fisheries Experimental Station Ariake Substation) 1955: *Asari zoshoku o mokuteki to shita higata kyakudo no koka nintei shiken hokoku* (Report of experiments on ascertaining the effect of resoiling tidelands aimed at Japanese short-necked clam propagation), *Senkai naiwan zoshoku jigyo oyobi kijigyo koka chosa hokokusho* (Survey report on shallow-sea inner bay propagation project and said project effectiveness), (1953): 163-172

402. SEKINE, Shusaburo, 1927: *Asari, hamaguri ni kansuru kio no kagakuteki kenkyu* (Existing chemical studies on the Japanese short-necked clam and hard clam), *Suisan Kenkyu Shi* (Journal of Fisheries Research), 22 (2): 33-35

403. SEKINE, Haruo, 1941: *Hokkaido, Karafuto-san asari no sanranki ni tsuite* (On the spawning season of Hokkaido and Sakhalin-grown Japanese short-necked clams), *Sapporo Norin Gakko Kaiho* (Bulletin of the Sapporo Agricultural and Forestry School), 32 (158): 1-7

404. SENOO, Hidemitsu, 1927: *Tokyo-wan ni okeru hamaguri, kaki, asari, akagai no saikin no nensangaku* (Recent annual production of hard clams, oysters, Japanese short-necked clams and ark shells in Tokyo Bay), *Suisan Kenkyu Shi* (Journal of Fisheries Research), 22 (11): 315-316

405. Idem 1948: *Asari no chigai hogo ni tsuite* *(Kairui no zosan ni taisuru ichiteian)* (On the protection of Japanese short-necked clam spats (A proposal for production increase in shellfish)), *Yumehamaguri* (*Callanaitis hiraseana* KURODA), (28): 139

(On the coast between Urayasu and Yawata in Chiba Prefecture, in the spring countless rice-grain sized Japanese short-necked clam seedlings were seen, but during the period of water temperature rise in July and August they get exposed to the air at neap tide and an average of 62% die, with total annihilation sometimes occurring in extreme cases. In order to prevent this, a dike should be built and means devised so that the water will not dry up even at ebb tide.)

406. Shen, Chai-Jui, 1932: The Brachyuran Crustacea of North China. Zoologica Sinica, Ser. A. 9: 131

407. SHIMIZU, Toshi, 1960: *Shafutsu ni yotte henka suru asari-chu no Vitamin B_{12} to Cobalt no ganyuryo* (Vitamin B_{12} and cobalt content in the Japanese short-necked clam that change by boiling), *Sagami Joshidai Kiyo* (Bulletin of the Sagami Women's College), 8: 36-41

408. Shimizu, T. 1967: Annual Fluctuations of several inorganic Elements in Short-necked Clam. Bull. Jap. Soc. Sci. Fish., 33: 686-689

409. SHINKAWA, Hideaki, 1953: Heikakuji ni okeru asari no Glycogen ryo no henka ni tsuite (On the change in glycogen level in the Japanese short-necked clam during shell closure), Dozatsu (Zoology Journal), 62 (3/4): 156-157

410. Idem 1980: Kancho kasen no kairui (Shellfish in tidal rivers), Hiroshima Joshi Daigaku Chiiki Kenkyu Sosho - I (Regional Research Series of the Hiroshima Women's College - I), 150 P, Keisuisha (Publ.) Co., Hiroshima

411. SHINOHARA, Kai, Akihiro OKI, Yasuhiro SAKAI et al. 1979: Tokyo-wan san gyokairuichu no jukinzoku ni kansuru kenkyu - tokuni asari, kaigara oyobi teishitsu ni tsuite (A study on heavy metals in Tokyo Bay-grown fish and shellfish - with particular reference to the Japanese short-necked clam, shells and bottom matter), Shokuhin Eisei Kenkyu (Food Hygiene Research), (29): 291-299

(Taking up Tokyo Bay-grown Japanese short-necked clams as an indicator (29) species of heavy metal contamination in Tokyo Bay and at the same time measuring the content level of seven types of heavy metal, T-Hg, Pb, Cd, Cr, Cu, Zn, Co as well as As contained in the shells and bottom matter, the extent to which the contamination in seawater of coastally sedentary Japanese short-necked clams is reflected was examined. The heavy metals in Japanese short-necked clam meat ranked in the order of Zn (14.6 ppm dry weight) > Cu > As > Pb = Cr > Cd = Co (0.1 ppm) > T-Hg. Also, the average concentration of heavy metal was in the order of bottom matter > Japanese short-necked clam > shells in order of lowness.)

412. SHISHIDO, Ichiro, 1895: Sendai chiho kairui sanranki (The spawning season of shellfish in the Sendai region), Suisan Chosa Hokoku (Fisheries Survey Report), 3 (12): 27-116

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413. Idem 1898: *Kaisui enbun zogen oyobi dokubutsu no asarirui ni oyobosu sayo* (The effect of seawater salinity fluctuations and toxic matter on Japanese short-necked clams), *Dozatsu* (Zoology Journal), 10 (116): 194-197

414. Shizuoka-ken Suisan Shikenjo (Shizuoka Prefecture Fisheries Experimental Station) 1934: *Asari, hamaguri yoshoku shiken* (Experiments on Japanese short-necked clam and hard clam cultivation), *Shizuoka Suishi Jiho* (Report of the Shizuoka Prefecture Fisheries Experimental Station), (1934): 199-202

415. Idem 1935: Idem, Ibid., (1935): 503-512

416. SOGAME, Yoshio, 1983: *Umibe de mirareru nimaigai - Tokushu* *Kai no kansatsu* (Bivalves that can be seen at the seaside - Special edition. Observations of shellfish), *Saishu to Shiiku* (Collecting and Breeding), 45 (7): 284-295

417. SUDA, Eiji, 1935: *Reiketsu dobutsu tainai "Spirochaeta" no kenkyu,* *Sono ichi*, *Bensairui ni okeru Spirochaeta ni tsuite* *(Shoroku)* (Studies on "Spirochaeta" in the body of cold-blooded animals. Part 1. On Spirochaeta in *Lamellibranchiata* (Excerpt)), *Yoshokukai Shi* (Journal of the Cultivation Society), 5 (12): 32-33

418. SUDO, Shunzo, Junichiro SAGARA, Yoshinori OGAWA, Osamu UMEBAYASHI and Koichi ARAKI 1971: *Tributyl tin oxide oyobi dichloronitrosalicylanilide no kaitei seibutsu ni taisuru eikyo* (The effect of tributyl tin oxide and dichloronitrosalicylanilide on benthic organisms), *Suisan Zoshoku* (Fisheries Propagation), 18 (4): 165-166

419. SUEHIRO, Yasuo, 1952: *Hamana-ko san asari, kaki ni kansuru seirigakuteki chiken* (Physiological knowledge on Lake Hamana-grown Japanese short-necked clams and oysters), *Suisan Kenkyukai Ho* (Bulletin of the Fisheries Research Society), (4): 38-43

420. Idem 1955: *Hamana-ko san asari to kaki no kekkyu ni tsuite* *(Dokugai no dokuka genin narabi ni taisaku no kenkyu)* (On the blood corpuscles of

Lake Hamana-grown Japanese short-necked clams and oysters (A study of the cause of toxication of poison shellfish and countermeasures)), Showa niju-shichi-nijuku nendo Monbusho kagaku shiken kenkyuhi ni yoru hankenkyu hokokusho (Group research report based on 1952-1954 scientific experimental research funds of the Ministry of Education), 101-104

421. SUEHIRO, Yasuo, et al. (Ed.) 1962: Asari, hamaguri (The Japanese short-necked clam and hard clam), Suisan Handbook (Fisheries Handbook), 215-216, Toyo Keizai Press

422. SUGAWARA, Kaneo, and Tensei EBIHARA 1951: Kairui no kuchu katsuryoku to suibun no shoshitsu (The vitality in air and loss of moisture of shellfish), Chiba Suishi Geppo (Monthly Bulletin of the Chiba Prefecture Fisheries Experimental Station), 2 (3): 13-25

423. SUGAWARA, Kaneo, and Michinori TAMAKAWA 1953: Asari chigai no nenekikai bunpi ni yoru fujo gensho ni tsuite (Nissuikai Chushikoku Shibu Taikai Kiji) (On the flotation phenomenon by slime clot secretion of Japanese short-necked clam spats (Proceedings of a Conference of the Chushikoku Branch of the Fisheries Society of Japan)), Nissuishi (Journal of the Fisheries Society of Japan), 18 (12): 739-740

424. SUGAWARA, Kaneo, Tensei EBIHARA and Junno KAWANA 1967: Tokyo-wan okubu no asari higai genin ni tsuite (On the cause of damage to the Japanese short-necked clam in inner Tokyo Bay), Chiba Naiwan Suishi Choho (Survey Report of the Chiba Prefecture Inner Bay Fisheries Experimental Station), (9): 74-88

425. SUGINO, Toshiro, and Takaaki ISHIKAWA 1966: Showa yonju nen asari hogo suimen chosa hokoku (1965 survey report on Japanese short-necked clam protected waters), Mie Suishi Ise Bunjo (Mie Prefecture Fisheries Experimental Station Ise Substation)

426. SUGIURA, Yasuo, Akio SUGITA and Masayuki KIHARA 1960: Asari yoshoku ni okeru yugai dobutsu to shite no kakuregani no seitai - I. Asari ni kyosei suru ooshiropinno no seitai to asari no miiri ni oyobosu eikyo ni tsuite (Ecology of the oyster crab as a noxious animal in Japanese short-necked clam cultivation - I. On the ecology of Pinnotheres sinensis SHEN commensal on the Japanese short-necked clam and the effect on the fleshing-out of the Japanese short-necked clam), Nissuishi (Journal of the Fisheries Society of Japan), 26 (2): 89-94

(Examining the ecology and life history of Pinnotheres sinensis SHEN commensal (in part) on the Japanese short-necked clam, it is made clear that the fleshing-out of the Japanese short-necked clam is greatly inhibited by the commensalism and that its fluctuational tendency is synchronous year-round with those non-commensalized.)

427. Idem 1960a: Idem - II. Asari ni kyosei suru asari-pinno seitai to asari no miiri ni oyobosu eikyo ni tsuite (On the ecology of "asari-pinno"* commensal on the Japanese short-necked clam and the effect on the fleshing-out of the Japanese short-necked clam), Ibid., 26 (6): 565-569

(The ecology and life history of "asari-pinno" and the damage to the Japanese short-necked clam have been examined. This species is commensal on, in addition to the Japanese short-necked clam, the mussel Mytilus (30) edulis, Crassostrea gigas (THUNBERG), hard clam and such as well. The adults lead both free and commensal lives. A seasonal variation can be seen in the rate of commensalism, which becomes low in August - November because the crabs leave the host, but becomes high again in December and continues on until around July. The rate of commensalism is high in Japanese short-necked clams exposed on the sand. Mixed habitation with

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* Translator's note: Literally translatable as "Japanese short-necked clam Pinnotheres"

Pinnotheres sinensis SHEN occurs in many instances. The existence of an ecological relationship between the two species would be suspected. While this species is lower in the rate of commensalism than *Pinnotheres sinensis* SHEN, it exerts a negative effect on the fleshing-out of the host.)

428. Suisan-cho Shinko-ka (Promotion Section, Fisheries Agency) 1959: *Tokyo-wan no hitode no seitai to sono higai taisaku ni kansuru kisoteki kenkyu* (Basic research on the ecology of starfish in Tokyo Bay and measures to counter their damage), *Suisan-cho Gyogyo Shinko-ka Suisan Zoshoku Shiryo* (Fisheries Propagation Data of the Fisheries Promotion Section, Fisheries Agency), No. 21

429. SUZUKI, Shizuo, 1983: *Asari yoshoku shiken* (Japanese short-necked clam cultivation experiments), *Gyoson* (Fishing Village), 49 (6): 27-29

430. SUZUKI, Tomoji, 1951: *Toki ni okeru asari ekisubun (I)* (Japanese short-necked clam extract content in winter (I)), *Yakugaku Zasshi* (Pharmacology Journal), 71: 195-198

431. Idem 1951a: Idem (II) *Asari no kinniku oyobi zoki no ekisubun* (Extract content in the muscles and internal organs of the Japanese short-necked clam), Ibid., 71: 198-201

432. Idem 1951b: *Shunki ni okeru asari ekisubun no kenkyu* (A study of the Japanese short-necked clam extract content in spring), Ibid., 71: 201-206

433. Idem 1951c: *Asari tanpaku no aminosan no bunseki* (An analysis of amino acid in Japanese short-necked clam protein), Ibid., 71: 516-518

434. TAKAMI, Toyo, 1979: *Asari no jinko shubyo seisan ni kansuru kenkyu - I NH_4OH chushaho ni yoru sanran yuhatsu to shiiku* (Studies on artificial seedling production of the Japanese short-necked clam - I. Spawning inducement by the NH_4OH injection method and breeding), *Yamaguchi Naikai Suishi Hokoku* (Bulletin of the Yamaguchi Prefecture Inland Sea Fisheries Experimental Station), (7): 11-18

(Injecting NH_4OH into the gonads of Japanese short-necked clams and inducing spawning, seedling production experiments were conducted, and in terms of the concentration and quantity of NH_4OH, 0.1 N (0.2 mL) and 0.05 N (0.3 mL) produced good results. ♂ began to discharge after 5 minutes in the early case and ♀ after 30 minutes, continuing for 55 - 110 minutes. From one ♀ (38 mm, 14.5 g) approximately one million eggs were spawned, with the fertilized eggs reaching the 2 - 4 cell stage after 40 minutes at a water temperature of 21.5° C, and becoming D-shaped larvae in 18 hours, ingesting Monocrysis lutheri, Chlorella sp. and such after 2 days. By the 7th - 8th day they are umbo stage larvae, by the 12th day mature larvae and on the 15th day at 230 μ they settle en masse, at 260 μ they secrete mucous byssus threads, at 300 μ they burrow in sand, at 414 μ filiform byssus threads and an exhalant siphon are perfected and at 2 mm or more an inhalant siphon is perfected. The yield rate is 40% ten days after fertilization, 30% at 27 days, and 16% at 0.9 - 5.0 mm after seven months.)

435. TAKANO, Hideaki, 1979: Asari doku (Kaidoku to plankton) (Japanese short-necked clam poison (Shellfish poison and plankton)), Suisan Shinko (Fisheries Promotion), 13 (11): 1-23

436. Idem 1982: Asari doku (Kai chudoku to plankton) (Japanese short-necked clam poison (Shellfish poisoning and plankton)), Seto Naikai no Kaidoku Textbook (Textbook on Shellfish Poison in Seto Inland Sea), 1-3, Seto Inland Sea Fisheries Development Council

437. TAKATSUKI, Shunichi, 1961: Asari no shokumotsu shoka katei to sore ni tazusawaru shoka koso no seijo (Seibutsu seisan ni kansuru symposium no shokai) (Food digestion process of the Japanese short-necked clam and the properties of the digestive enzymes involved in it (Introduction of a symposium on bioproduction)), Suisan Zoshoku (Fisheries Propagation), 8 (4): 246-249

(The food particles conveyed to the mouth via the gills and lips are entangled in mucus and through the esophagus are conveyed by the action of cilia to the stomach. The digestive fluid is all due to a dissolution of crystalloids and is not secreted from the walls of the stomach. The gastric juice is weakly acidic at pH 5 - 6, and hyaluronidase which dissolves mucus is present in the gastric juice and middle intestinal gland. Also, in the crystalline style are contained amylase (a carbohydrate decomposing enzyme) and lipase (lipolytic enzyme), but no protease (proteolytic enzyme) exists. Animal feed is decomposed by self-digestion, and proteolytic enzymes exist in the middle intestinal gland as intracellular digestive enzymes. In addition to the foregoing, there are detailed physiological explanations on the digestive system of the Japanese short-necked clam.)

438. TAKATSUKI, Shunichi, and Motoo HOZUMI 1959: Asari no kanshotai ni fukumareru shibo bunkai koso (Koen yoshi) (Lipase contained in the crystalline style of the Japanese short-necked clam (Gist of lecture)), Dozatsu (Zoology Journal), 68 (2/3): 62 (31)

(Detecting the lipase contained in the crystalline style of the Japanese short-necked clam by the Warburg method according to Rona & Lasnitzki, its general properties have been described.)

439. TAKEUCHI, Hideo, 1936: Asari no kaigara no heni to teishitsu to no kankei (The relationship between variation in the shell of the Japanese short-necked clam and bottom matter), Yoshokukai Shi (Journal of the Cultivation Society), 6 (4): 77-83

440. TAKI, Isao, 1948: Nimaigai no kei, seitai sandai ① Asari to himeasari no sai ni tsuite (Tosha) (Three topics on the morphology and ecology of bivalves ① On the difference between the Japanese short-necked clam and Tapes (Amygdala) variegata (SOWERBY) (Copy)), Yumehamaguri (Callanaitis hiraseana KURODA), (27): 84

441. Idem 1950: Doku asari seisokuchi no seitaigakuteki kenkyu (An ecological study of the habitat of poisonous Japanese short-necked clams), Ibid., (47): 327-342

442. Idem 1950-'52: Senkai zoshoku chosa hokoku (Dai ichi - jusanpo) (Survey reports on shallow-sea propagation (Reports No. 1 - 13)), Suisan-cho Gyoshu Nika (Second Fisheries Survey Section, Fisheries Agency)

443. Idem 1957: Hamana-ko kairui dokuka chitai ni okeru kairui no seisoku narabi ni shigara no taiseki jotai ni tsuite (Koen yoshi) (On the habitation of shellfish and the state of accumulation of remains in the shellfish toxication zone of Lake Hamana (Gist of lecture)), Dozatsu (Zoology Journal), 60 (1/2): 44

444. TAKI, Iwao, 1938: Asari no kara hanmon no sayu fusosho ni tsuite (Koen yoshi) (On the bilateral asymmetry of the shell spots of the Japanese short-necked clam (Gist of lecture)), Kaizatsu (Shellfish Journal), 8 (3/4): 177-178

445. Idem 1941: Asari no kara hanmon no heni, tokuni sono sayu fusosho ni tsuite (Variation in shell spots of the Japanese short-necked clam, with particular reference to their bilateral asymmetry), Ibid., 11 (2/3): 70-87

(A definitive edition on spot colouration research that has examined the spots on the shell of the Japanese short-necked clam with respect to over 100,000 samples. The spots on the shell of the Japanese short-necked clam can be broadly divided into the ripple type (W), mottled type (M), belt-figured type (B) and white-coloured type (A). These can be further subdivided into the chestnut-coloured ripple type (Wa), coarse-figured type (We), black-coloured type (Mp), branched type (Md), belt-figured type (Ba), beltless type (Bl), chestnut-coloured belt type (Bc), brown-coloured belt type (Bb), yellow-coloured belt type (By), purple-coloured belt type (Bp) and such. The inner surface of the shell also has been grouped into the purple-coloured margin (Pm), purple-coloured (P), posterior margin purple-coloured (Pp), orange-coloured (O), posterior margin red-coloured (R).)

446. TAMURA, Tadashi, 1937: Teionki ni okeru kakushu kaisan kairui no seitai narabi ni sanso shohiryo ni tsuite (On the ecology and oxygen consumption volume of various marine shellfish in low temperature periods), Suisangaku Zasshi (Fisheries Science Journal), 41

447. Idem 1960: Asari no zoshoku (Nimaigai no zoshoku) (Propagation of the Japanese short-necked clam (Propagation of bivalves)), Senkai Zoshokugaku (Shallow-sea Propagation Science), 218-225, Koseisha Koseikaku (Publ.), Tokyo

(The subject of propagation in general such as the method of propagation and method of transport of the Japanese short-necked clam has been pertinently summarized.)

448. Idem 1967: Senkai zoshokujo no kankyo II (The environment of shallow-sea propagation grounds II), Suisan Zoyoshoku Sosho (Fisheries Propagation and Cultivation Series), 15-2, 72 p, Fisheries Resource Protection Association

449. TANAKA, Kiichi, 1980: Asari (The Japanese short-necked clam), Ryoriho Tsuki Gyokai Zukan (Fish and Shellfish Picture Book with Cooking Methods), 116-117, Daiichi Publishing, Tokyo

450. TANAKA, Ryo, 1950: Asari to himeasari to no shuteki bunka no mondai to Law of Sample Allometry (The problem of specific differentiation between the Japanese short-necked clam and Tapes (Amygdala) variegata (SOWERBY) and the Law of Sample Allometry), Kagaku (Science), 20 (6): 281-283

451. Idem 1950a: Asari to himeasari no shuteki bunka ni taisuru seibutsu tokeigakuteki konkyo (Koen yoshi) (Biostatistical grounds for specific differentiation between the Japanese short-necked clam and Tapes (Amygdala) variegata (SOWERBY) (Gist of lecture)), Dozatsu (Zoology Journal), 59 (2/3): 31-32

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452. Tanaka, R. 1951: Biostatistical Grounds for Specific Differentiation between two Species of *Venerupis* (Bivalvia), Annot. Zool. Jap., 24 (3): 163-169

453. TANAKA, Yataro, 1954: *Asari ni kansuru ni, san no kansatsu* (Two or three observations on the Japanese short-necked clam), *Sai to Shi* (Collecting and Breeding), 16 (10): 311-312

454. Idem 1954a: *Formalin kotei ni yoru asari no taiju henka* (Weight change of Japanese short-necked clams due to formalin fixing), *Ariake-kai Kenkyu Hokoku* (Ariake Sea Research Bulletin), (1): 1-3

(In the case where Japanese short-necked clams with shell are fixed in formalin, it has been made clear that there is no need to consider the size of the Japanese short-necked clam or formalin concentration, nor is there any need to handle them by particularly distinguishing them from their weight while alive.)

455. Idem 1954b: *Asari no nenrei satei ni kansuru ichikosatsu* (A study on age assessment of the Japanese short-necked clam), *Ariake-kai Kenkyu Hokoku* (Ariake Sea Research Bulletin), (1): 7-9 (32)

456. Idem 1954c: *Gomafudama ga asari no kara ni aketa ana no tokusei narabi ni gomafudama no shizetsu ni tsuite* (On the characteristics of the hole bored in the shell of the Japanese short-necked clam by *Notocochlis tigrina* (RÖDING) and on the radula of *Notocochlis tigrina* (RÖDING)), *Kaizatsu* (Shellfish Journal), 18 (1): 34-39

(The results of having examined the position, shape, size and such of the hole bored in the Japanese short-necked clam by *Notocochlis tigrina* (RÖDING) have been described. ① The position of the hole varies and cannot be specified. ② The number of holes is one, with none having two or more. ③ The shape of the hole is subcircular close to an oval, is conical, and the edge is jagged. ④ The size of the hole is 2.0 - 3.5 mm

at the outer opening with an average of 2.6 mm and 0.9 - 2.4 mm at the inner opening with an average of 1.6 mm.)

457. Idem 1954d: Asari no seihi (Tosha) (Sexual ratio of the Japanese short-necked clam (Copy)), Yumehamaguri (Callanaitis hiraseana KURODA), (74): 20

458. Idem 1954e: Asari no seishi ni tsuite (On the sperm of the Japanese short-necked clam), Sai to Shi (Collecting and Breeding), 16 (10): 312

459. Idem 1954f: Ariake-kai san juyo nimaigai no sanranki - III (Spawning season of important Ariake Sea-grown bivalves - III), Nissuishi (Journal of the Fisheries Society of Japan), 19 (12): 1165-1167

(The peak spawning season of Ariake Sea-grown Japanese short-necked clams occurs twice in mid - late May and early November. Spawning starts in early March and ends in early December.)

460. Idem 1956: Yuyo nimaigai no seikatsuryoku ni oyobosu teicho kaisui no eikyo (The effect of inactive seawater on the vitality of useful bivalves), Ariake-kai Kenkyu Hokoku (Ariake Sea Research Bulletin), (3): 24-29

(The resistance to inactive seawater of 11 species of useful Ariake-grown bivalves in addition to the Japanese short-necked clam was examined on the basis of the ciliary movement of the gills and living conditions.)

461. Idem 1959: Asari yosei no dotei ni tsuite (On the identification of Japanese short-necked clam larvae), Ibid., (5): 5-7

(The structure of the embryo shell, particularly the squeezing apparatus, of mature larvae of the Japanese short-necked clam has been graphically described in detail, and the difference from the morphologically similar "shizukugai"* and such which emerge around the same period has been discussed.)

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* Translator's note: A type of shellfish whose translation is unknown

462. Idem 1970: Sushu no nimaigai ni oyobosu gesui nama odei no eikyo (The effect of raw sewage sludge on several species of bivalves), Tosuiken Gyoseki (Results of the Tokai Regional Fisheries Research Laboratory), E-15: 10-16

463. TANAKA, Yataro, Satsuko HAMADA, Junichiro SAGARA and Hisakichi TSUTSUI 1974: Hinsanso suikai no keisei to kairui no seisan ni kansuru kenkyu (A study on the formation of oxygen-deficient water mass and the production of shellfish), Norin suisan seitaikei ni okeru osen busshitsu no junkan to shihyo seibutsu ni kansuru kenkyu (Studies on the circulation of pollutants and indicator organisms in agricultural, forestry and fishery ecosystems), 45-47

464. TANAKA, Yoshio, (Ed.) and Tominosuke FUJINO (Asst.) 1902: Suisan meii (Zen) (Compilation of fishery names (Complete)), Dai-Nippon Suisankai Ho (Bulletin of the Fisheries Society of Japan), (237): Appendix

465. TANIDA, Senji, 1960: Asari (Suisan dobutsugaku) (The Japanese short-necked clam (Marine zoology)), Suisangaku Zenshu (Complete Works on Fisheries Science), 8: 111-113, Koseisha Koseikaku (Publ.), Tokyo

466. TAWARA, Yuhojin, Mitsuru HIBINO and Einoshin ITO 1977: Mikawa-wan no higata riyo, Fudeiiki ni okeru jinko sunaba zosei oyobi asari no hoyo shiken kekka (Tideland utilization in Mikawa Bay. Construction of artificial sand pit in rotten mud zone and experiments on open cultivation of Japanese short-necked clams), Suisan Doboku (Fisheries Civil Engineering), 14 (1): 33-37

(Constructing an artificial sand pit in the rotten mud zone in the shallow sea of inner Mikawa Bay, the growth of Japanese short-necked clams was examined. A 20 x 20 m sheet was spread over the rotten mud, 100 m^2 of river sand were spread, and Japanese short-necked clam spats were seeded at a density of 1 kg/m^2 and their growth was examined. Between the sand

pit and mud field there was a difference of 6 - 6.4 times in the amount of growth per day.)

467. TAWARA, Yuhojin, and Einoshin ITO 1978: *Jinko sunaba ni okeru asari no hoyo* (Open cultivation of Japanese short-necked clams in an artificial sand pit), *Aichi Suishi Jiho* (Report of the Aichi Prefecture Fisheries Experimental Station), (1977): 61-62

468. TAWARA, Yuhojin, Kyu HOSOKAWA and Hideaki TASHIRO 1979: *Jinko higata zosei (Kairui zoshoku)* (Artificial tideland construction (Shellfish propagation)), Ibid., (1978): 61-62

469. TERASHIMA, Sunao, and TAKAGI 1972: *Asari, sarubo no rosuiryo to setsuji ni oyobosu nigori no eikyo ni tsuite* (On the effect of turbidity on the filtration volume and feeding of the Japanese short-necked clam and ark shell), *Okayama Suishi Jiho* (Report of the Okayama Prefecture Fisheries Experimental Station), (1971): 154-159

470. TOKASHI, Kunisaburo, 1930: *Asari no taiju to shinzo hakudosu to no kankei ni tsuite* (On the relationship between the body weight and heartbeat rate of the Japanese short-necked clam), *Hakubutsugaku Zasshi* (Natural History Journal), 28 (40): 24-30 (33)

471. TOKUHISA, Mishina, 1941: *Kounki ni yoru senkai higatamen no suisan zoshoku* (Fisheries propagation in shallow-sea tideland surfaces by means of a cultivator), *Teisui* (Imperial Fisheries), 20 (2): 11-24

472. TOKUHISA, Mishina, Hiroshi NIINO, Yoshimi KITAGAWA, Saburo WAKITA and Mitsuo AOKI 1950: *Chikasui riyo ni yoru shubyo hogo ikusei* *(Kenkyu keika hokoku)* (Seedling protection and growth by utilization of underground water (Research progress report)), *Suisan Kenkyukai Ho* (Bulletin of the Fisheries Research Society), (3): 44-47

473. Tokyo-fu Suisan Shikenjo (Tokyo Prefecture Fisheries Experimental Station) 1928: *Asari, hamaguri yoshoku shiken* (Experiments on Japanese short-necked

clam and hard clam cultivation), Tokyo Suishi Gyoho (Report on Operations of the Tokyo Prefecture Fisheries Experimental Station), (1927-1928): 96-108

474. Idem 1929: Idem, Ibid., (1929) (2): 26-35

475. Idem 1930: Idem, Ibid., (1930) (3): 42-47

476. Idem 1931: Idem, Ibid., (1931) (4): 56-61

477. Idem 1932: Idem, Ibid., (1932) (5): 63-66

478. Tokyo-to Suisan Shikenjo (Tokyo Metropolitan Fisheries Experimental Station) 1950: Kanryushiki saibyo shiken (Experiments on slow-flowing type seedling collection), Tokyo Suishi Jiho (Report of the Tokyo Metropolitan Fisheries Experimental Station), (1950): 11-13

479. Idem 1952: Kairui higai chosa (Shellfish damage survey), Ibid., (1952): 1-2

480. Idem 1955: Kairui gyojo koun koka shiken (Experiments on the effectiveness of tilling of shellfish fishing grounds), Ibid., (1953): 56-60

481. Idem 1956: Idem, Ibid., (1954): 43-47

482. Idem 1956a: Asari shubyo makitsuke tekiseiryo chosa (Survey on the proper amount of seeding of Japanese short-necked clam seedlings), Tokyo Suishi Jiho (Report of the Tokyo Metropolitan Fisheries Experimental Station), (1955): 32

483. Idem 1958: Idem, Ibid., (1956): 21

484. Idem 1958a: Tokyo-to naiwan higatabu ni okeru kairui bunpu no hensen to genjo ni tsuite (On the changes in and present state of shellfish distribution in the inner bay tideland area of Tokyo Metropolis), Tokyo Suishi Shuppanbutsu Tsukan (Serial Publication of the Tokyo Metropolitan Fisheries Experimental Station), (110): 1-116

485. Idem 1959: Nimaigai no shigo keika nissu no suiteiho ni tsuite (On a method of estimating the number of days since death of bivalves), Ibid., (113): 1-31

486. Idem 1959a: Asari makitsuke tekisei shiken (Experiments on proper seeding of Japanese short-necked clams), Tokyo Suishi Jiho (Report of the Tokyo Metropolitan Fisheries Experimental Station), (1957): 24

487. TOMIYASU, Yukio, Masamichi TOYOMIZU and Hisamitsu MITSUFUJI 1952: Asari taiseibun no kisetsuteki henka ni tsuite (On the seasonal variation in the body components of the Japanese short-necked clam), Kyudai Nogakubu Gakugei Zasshi (Arts and Science Journal of the Agricultural Faculty, Kyushu University), 12 (3): 239-245

(The body components of Ariake-grown Japanese short-necked clams were examined. ① The gross weight and shell weight of the Japanese short-necked clam are proportional to the shell length, but the shucked meat weight manifests seasonal variation. ② The degree of corpulence (100 x dried meat weight/gross weight) manifests seasonal variation, and was maximal between early March - early June. ③ Crude fat and ash content do not manifest seasonal variation. ④ Crude protein and total carbohydrate manifest large seasonal variations, and indicate a mutually reciprocal tendency. The total carbohydrate and degree of corpulence have the same tendency of variation, and the body corpulence and recovery of the body after spawning depend on the total carbohydrate.)

488. TORIUMI, Makoto, 1979: Higata to sunahama, sonota no sunaji de no kansatsu (Kaigan dobutsu no seitai to kansatsu) (Observations on tidelands and sandy beaches and other sandy soils (Ecology and observation of coastal animals)), Seitai Kansatsu Series (Ecology Observation Series), 104-115, Tsukiji Shokan (Publ.)

489. TOZAWA, Harumi, and Junichiro SAGARA 1961: Nimaigai no vitamin B_{12} taisha ni tsuite - I. Jinko kaisui ni tenka shita hoshasei B_{12} no asari ni yoru kyushu (On vitamin B_{12} metabolism in bivalves - I. Absorption by the Japanese short-necked clam of radioactive B_{12} added to artificial seawater), Nissuishi (Journal of the Fisheries Society of Japan), 27 (8): 785-788

(① Radioactive B_{12} added to breeding seawater transfers rapidly to the body tissues. ② The content level of radioactive B_{12} is highest in the liver (middle intestinal gland) and gills, and low in the foot, gonads and mantle membrane. ③ The concentration coefficient (concentration contained in living body tissues/concentration in environmental water) of radioactive B_{12} in the body tissues, particularly the liver (middle intestinal gland) of the Japanese short-necked clam is extremely high, indicating the fact that considerable absorption and accumulation take place. ④ The transfer into the body of the Japanese short-necked clam of radioactive B_{12} in the breeding seawater referred to in ① is by direct absorption.) (34)

490. Idem 1961a: Nimaigai no vitamin B_{12} taisha ni tsuite - II. Asari no tainai oyobi jinko kaisuichu deno hoshasei B_{12} no anteisei (On vitamin B_{12} metabolism in bivalves - II. Stability of radioactive B_{12} in the body of the Japanese short-necked clam and in artificial seawater), Ibid., 27 (8): 789-792

491. TSUJI, Isao, 1976: Kai ryori (Shellfish dishes), Katei Ryorishu (Home Cooking Collection), 34: 6-9, 92-93, Hikarinokuni-sha (Publ.), Osaka

(The following recipes for Japanese short-necked clam dishes are presented. Clam salad, crepe-wrapped soup, Fukagawa broiled clam and rice, ginger-cooked, sake lees pot, stew, Western-style soup, Chinese-style rice gruel, Japanese short-necked clam dressed with bean-curd refuse, croquette, mixed noodles, Korean-style stew with vegetables, salted clam.)

492. TSUDA, (first name unknown), and KAWAI, (first name unknown), 1980: Kisomi kakoiki ni okeru kairui no suijaku, heishi genin ni tsuite (On the cause of debility and death of shellfish in the Kisomi delta region), Mie Ise-wan Suishi Nenpo (Annual Bulletin of the Mie Prefecture Ise Bay Fisheries Experimental Station), (1978): 72-83

493. TSUJII, Tei, 1965: Kisomi-kawa kakobu no kairui genkyo chosa, tokuni Sonhi-Nagara-gawa kakoiki no yuyo kairui ni tsuite (Survey of present state

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of shellfish in the Kisomi River delta section, with particular reference to the useful shellfish in the Sonhi-Nagara River delta region), Kisomi-kawa Kako Shigen Chosa Hokoku (Kisomi River Delta Resource Survey Report), (2): 315-409

494. Idem 1967: Kiso-kawa kakobu no kairui genkyo chosa, tokuni asari ni tsuite (Survey of present state of shellfish in the Kiso River delta section, with particular reference to the Japanese short-necked clam), Ibid., (3): 1-25

495. Idem 1967a: Kisomi kakoiki no nimaigai ni tsuite (On the bivalves in the Kisomi delta region), Engan Kaiyo Kenkyu Note (Coastal Oceanic Research Note), 6 (1): 13-19

496. Idem 1967b: Asari no sanranki ni tsuite (On the spawning season of the Japanese short-necked clam), Kisomi-kawa Kako Shigen Chosa Hokoku (Kisomi River Delta Resource Survey Report), (4, Last volume): 1417-1421

497. TSUJII, Tei, Kaoru HISHIKAWA, Takaaki ISHIKAWA, Junichiro SAGARA and Yataro TANAKA 1969: Kiso-misaki kantaku ga Kisomi-kawa kaiki no kairui gyogyo ni oyobosu eikyo ni tsuite (On the effect that Kiso Point land reclamation has on the shellfish fishing industry in the Kisomi River region), Kiso-misaki kantaku ni yoru suisan seibutsu to sono kankyo eno eikyo yosatsu chosa hokokusho (Preliminary survey report on the effect of Kiso Point land reclamation on marine organisms and their environment), 107-125

498. UCHIDA, Akira, 1965: Hototogisu no seicho to asari ni oyobosu eikyo ni tsuite (On the growth of Musculus (Musculista) senhousia (BENSON) and the effect on the Japanese short-necked clam), Chiba Naiwan Suishi Choho (Survey Report of the Chiba Prefecture Inner Bay Fisheries Experimental Station), (7): 69-78

(The effect of Musculus (Musculista) senhousia (BENSON) on the Japanese short-necked clams that inhabit the tidelands on the Urayasu waterfront

was examined. ① Where the settlement of *Musculus (Musculista) senhousia* (BENSON) is prevalent is where the stagnation of tidal currents or eddies easily occur and a place somewhat muddier than for the Japanese short-necked clam. ② The Japanese short-necked clam spats which live between dense *Musculus (Musculista) senhousia* (BENSON) colonies indicate a tendency towards malnutrition, with many perishing at 2 - 5 mm.)

499. WATANABE, Hajime, 1938: *Kairui no gaiteki hesokurigai ni tsuite* (On *Notocochlis tigrina* (RÖDING), a noxious enemy of shellfish), *Yoshokukai Shi* (Journal of the Cultivation Society), (8): 10-12

500. Williams, J.G. 1978: The Influence of Adults on the Settlement, Growth and Survival of Spat in the commercially important Clam, *Tapes japonica* Deshayes. Seattle, WA: Univ. of Washington. Available from: University Microfilms, Ann Arbor, MI; Publ. no. 78-20, 786. 70 p. Dissertation.

501. YAMAGUCHI, Masao, 1947: *Awaji-Kariya jisaki kaimen ni okeru bakagai no bakuhatsuteki hassei shuki to asari no bakuhatsuteki hassei to ni okeru shokanryu kaiku no sayo* (The function of small return-flow zones in the explosive developmental cycle of the round clam and the explosive development of the Japanese short-necked clam in the Awaji-Kariya waterfront waters), *Yumehamaguri* (*Callanaitis hiraseana* KURODA), (16): 8-10

502. YAMAGUCHI, Norio, 1978: *Asari no hitode ni yoru shokugai ni tsuite* (On the predation of the Japanese short-necked clam by starfish), *Fukushima Suishi Jiho* (Report of the Fukushima Prefecture Fisheries Experimental Station), (1977): 138-139

503. Yamaguchi-ken (Yamaguchi Prefecture) 1979: *Yamaguchi, Oumi-wan chiku - asari* (Yamaguchi and Oumi Bay regions - the Japanese short-necked clam), *Daikibo Zoshokujo Kaihatsu Jigyo Chosa Hokokusho* (Survey Report on Large-scale Propagation Ground Development Project), 65-67

(A survey conducted under the commissioned subsidy of the Fisheries Agency

in 1976-1978 to develop the tidelands of Yamaguchi and Oumi Bays as
Japanese short-necked clam fishing grounds. In order to provide a
production increase in the Japanese short-necked clam of both bays,
by introducing large-scale fisheries civil engineering techniques it is (35)
attempted to service undeveloped tidelands into an ideal fishing ground
environment consistent with their growth process from birth to breeding
of the spats. In addition to such basic surveys as on the distribution,
ecology and actual state of fishery of the Japanese short-necked clam,
valuable records are contained such as survey data necessary for
channel making and ground laying for the purpose of breeding ground
construction and for designing breakwaters and such for the purpose of
spat development ground construction.)

504. Yamaguchi-ken Naikai Suisan Shikenjo (Yamaguchi Prefecture Inland Sea Fisheries Experimental Station) 1952: *Omichi jisaki ni okeru asari seisoku jokyo narabi ni seitai chosa* (Survey of habitation state and ecology of the Japanese short-necked clam on the Omichi waterfront), *Yamaguchi Naikai Suishi Chokengyo* (Results of Survey Study of the Yamaguchi Prefecture Inland Sea Fisheries Experimental Station), 3 (2): 32-74

505. Yamaguchi-ken Suisan Shidosho (Yamaguchi Prefecture Fisheries Advisory Office) 1946: *Yamaguchi-ken ni okeru asari zosan ni tsuite* (On the production increase of the Japanese short-necked clam in Yamaguchi Prefecture), *Yamaguchi Suishi Tokushu* (Special Compilation of the Yamaguchi Prefecture Fisheries Advisory Office), (9): 1-9

506. Idem 1948: *Oumi-wan ni okeru asari no seisoku jokyo to ryushi sosei yori mitaru doshitsu to no kankei* (The relationship between the habitation state of the Japanese short-necked clam in Oumi Bay and the soil quality as viewed from the grain composition), *Yamaguchi Suishi Jiho* (Report of the Yamaguchi Prefecture Fisheries Advisory Office), (1948): 47-53

507. Idem 1950: *Yamaguchi-ken Seto Naikai-san asari no chihoteki keitai heni ni tsuite* (On the regional morphological variation of Japanese short-necked clams grown in Seto Inland Sea in Yamaguchi Prefecture), Ibid., (1950)

508. YAMAKAWA, Shinsaku, 1953: *Asari kaku hanmon keisei to tyrosinase sayo* (Shell spot formation on the Japanese short-necked clam and tyrosinase action), *Dozatsu* (Zoology Journal), 61 (3/4): 107

(Dividing the spot formation on the outside of the shell of the Japanese short-necked clam into three elements, an experiment was undertaken from the belief that the triangular and ∧-shaped elements which constitute the main spots get formed by the appearance and disappearance and spread to adjacent cells of some physiochemical condition in the pigmentation area of the mantle margin. As a result, the difference in tyrosinase action between the coloured area and white area of the mantle margin is thought to be due mainly to the degree of presence of SH radical in the tissue, and a physiological condition which makes the SH radical appear and disappear is reasoned to govern the pigmentation ability of the mantle margin and form the spots.)

509. YAMAKAWA, Shinsaku, 1953: *Asari gaitomakuen no tyrosinase sayo* (Tyrosinase action in the mantle margin of the Japanese short-necked clam), Ibid., 62 (3/4): 156

510. YAMAMOTO, Suketaro, and Gozo NISHIOKA 1943: *Ni, san no bensairui no jinko juseiho ni tsuite* *(Koen yoshi)* (On an artificial fertilization method for two or three *Lamellibranchia* (Gist of lecture)), *Dozatsu* (Zoology Journal), 55 (11/12): 372-373

511. YAMAMOTO, Kiichiro, 1952: *Atsukeshi-ko ni okeru asari ni kansuru kenkyu - I. Kishaku kaisuichu ni okeru jusei narabi ni shoki hassei* (Studies on the Japanese short-necked clam in Lake Atsukeshi - I. Fertilization and early development in diluted seawater), *Nissuishi* (Journal of the Fisheries Society of Japan), 18 (5): 191-196

512. YAMAMOTO, Kiichiro, and Fumio IWATA 1956: Idem - II. Seichodo oyobi saisho seitaikei (Rate of growth and minimum adult form), Hokusuiken Hokoku (Bulletin of the Hokkaido Regional Fisheries Research Laboratory), (14): 57-62

513. YANASE, Masaaki, 1953: Suisan dobutsu no vitamin B_{12} ni tsuite - III. Kairui no vitamin B_{12} ganryo (On vitamin B_{12} in marine animals - III. Vitamin B_{12} content level in shellfish), Nissuishi (Journal of the Fisheries Society of Japan), 18 (11): 24-26

514. YASUDA, Jisaburo, 1952: Mikawa-wan ni okeru nantai dobutsu fuyu shigai no choko narabi ni chuya ni yoru shutsugen jokyo ni tsuite (On the state of occurrence of free-swimming young of molluscs in Mikawa Bay depending on the tide period and day or night), Ibid., 17 (11): 342-344

515. YASUDA, Jisaburo, Seizo HAMAI and Hideyuki HORITA 1954: Asari no sanranki ni tsuite (On the spawning season of the Japanese short-necked clam), Ibid., 20 (4): 277-279

516. YASUDA, Jisaburo, and Shigeki TAKAMORI 1952: Asari shubyo ni kansuru kenkyu (A study on Japanese short-necked clam seedlings), Naisuiken Hokoku (Bulletin of the Inland Sea Regional Fisheries Research Laboratory), (2): 1-11

(The settled spats of the Japanese short-necked clam are most numerous on the front of bamboo screens perpendicular to the rising tidal current, while in the decremental period they are numerous on the front of bamboo screens perpendicular to the receding tidal current.)

517. YAZUKA, Tsuyoshi, 1953: Teishitsu no kangenso to asari (Restorative layer of bottom matter and the Japanese short-necked clam), Suisan Zoshoku (Fisheries Propagation), 1 (2): 45

518. YOKOTA, Hiroshi, 1983: Asarigai, hotategai, akoyagai no kara no hiryoteki koka (Fertilizational effect of the shell of the Japanese short-necked clam, scallop and pearl-oyster), Hiroshima Notandai Ho (Bulletin of the Hiroshima Agricultural Junior College), 7: 221-227

519. Idem 1984: Asarigai, hotategai, akoyagai no kara no hatsuka-daikon ni taisuru hiko (Fertilizational effect on "twenty-day white radishes" of the shell of the Japanese short-necked clam, scallop and pearl-oyster), Ibid., 7: 337-342 (36)

520. YOKOTA, Takio, 1953: Shigen chosa to suisan zoshoku (Resource survey and fisheries propagation), Suisan Kagaku (Fisheries Science), (11): 1-5

521. Idem 1957: Nimaigai no fuchaku ni tsuite (On the attachment of bivalves), Suisangaku Shusei (Fisheries Science Collection), 565-567, Tokyo University Publishing Society

522. Yoo, S.K., Y.J. Chung & H.Y. Ryu 1978: Biological Studies on the Propagation of Important Bivalves - VI. Morphological Characteristics of Short-necked Clam, Tapes japonica. Bull. Nat. Fish. Univ. Busan, 18 (1/2): 89-94

523. YOSHIDA, Yutaka, 1935: Asari no seijuku Veliger oyobi teisei shoki no chigai ni tsuite (On the mature veliger and early bottom-dwelling spat of the Japanese short-necked clam), Kaizatsu (Shellfish Journal), 5 (5): 264-273

524. Idem 1941: Hamaguri no shoki seikatsushi ni tsuite (On the early life history of the hard clam), Ibid., 11 (1): 9

525. Idem 1947: Senkai kairui no zoshoku joken (Senkai ni sumu yuyo kairui no kankyo joken) (Propagation conditions for shallow-sea shellfish (Environmental conditions for useful shellfish living in shallow seas)), Norin-sho Suisan-kyoku Chosei-ka (Coordination Section, Fisheries Bureau, Ministry of Agriculture and Forestry)

526. Idem 1950: Asari, hamaguri, mogai zoshoku ni tsuite (On the propagation of the Japanese short-necked clam, hard clam and Anadara (Scapharca) subcrenata (LISCHKE)), Dai-nikai senkai zoshoku gijutsu shido koshukai (Yoroku) (Second advisory symposium on shallow-sea propagation techniques (Digest)): 58-66, Suisan-cho Gyogyo Chosei Daini-ka (Second Fisheries Coordination Section, Fisheries Agency)

527. Idem 1953: *Nimaigai no chishiki ni okeru tekio ni tsuite* *(Nissuikai Chushikoku Shibu Taikai Kiji)* (On adaptation in the spat stage of bivalves (Proceedings of a Conference of the Chushikoku Branch of the Fisheries Society of Japan)), *Nissuishi* (Journal of the Fisheries Society of Japan), 18 (12): 739

528. Idem 1953a: *Asari* *(Senkai-san yuyo nimaigai no chishi no kenkyu)* (The Japanese short-necked clam (A study of the spat of useful shallow-sea grown bivalves)), *Nosuiko Kenho* (Research Bulletin of the Agricultural and Fisheries Institute), 3 (1): 34-54

(With respect to the spat of the Japanese short-necked clam, important information has been summarized concerning spat ecology such as the ecology of each stage, change in morphology, growth, individual development of spots, resistance to changes in the environment (temperature, specific gravity, soil and sand accumulation), and distinction from similar species.)

529. Idem 1960: *Himeasari no shoki seikatsushi ni tsuite* (On the early life history of *Tapes (Amygdala) variegata* (SOWERBY)), Ibid., 10 (1); 115-118

(Along with describing the morphology, growth and such of the free-swimming spat of *Tapes (Amygdala) variegata* (SOWERBY), comparisons are made with the closely related Japanese short-necked clam. ① In contrast to the fact that the Japanese short-necked clam is distributed in gentle-wave locations in the inner bay (inner bay type), *Tapes (Amygdala) variegata* (SOWERBY) is distributed in the open sea where the oscillation of seawater is rough (open sea type). ② In *Tapes (Amygdala) variegata* (SOWERBY) the structure of the feeler on the (inhalant) siphon is more complex than in the Japanese short-necked clam, with the exhalant and inhalant siphons being separated at the base. ③ In the free-swimming (veliger) larvae, the anterior and posterior tips of the shell are more rounded than in

the Japanese short-necked clam, and the dentiform incisions on the squeezing apparatus are poorly developed compared to the Japanese short-necked clam, with their number being low at 8 - 10 as well.)

530. Idem 1964: Asari (The Japanese short-necked clam), Kairui Shubyogaku (Shellfish Seedling Science), 156-163, Hokuryukan (Publ.), Higashihara

(The changes in morphology, ecology, spots, growth and such of Japanese short-necked clam spats have been concisely summarized.)

531. YOSHIDA, Yutaka, and Mamoru MAEDA 1952: Asari no ashiito ni tsuite (On the byssus thread of the Japanese short-necked clam), Nissuiken Soritsu Sanshunen Kinen Ronbunshu (Collection of Papers Commemorating the Third Anniversary of the Founding of the Fisheries Research Society of Japan), 321-325

(① The byssus thread secretion function is pronounced at the spat stage of shallow burrowing into bottom matter and in places of coarse grain composition. Also, this tendency is strong in places of fast water flow. ② The byssus thread secretion mechanism has been histologically observed and illustrated.)

532. YOSHIDA, Yutaka, 1967: Hamaguri, asari (The hard clam and Japanese short-necked clam), Yoshokugaku Kakuron (Details of Cultivation Science), Suisangaku Zenshu (Complete Works on Fisheries Science), 693-712, Koseisha Koseikaku (Publ.), Tokyo

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IV. Others

1. Experimental research methodology

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2. Miscellaneous

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Epilogue

The name "asari" (Japanese short-necked clam) is said to have derived from a shellfish that is foraged for ("asaru") on an ebb-tide beach, in short, "asari (foraged-for) shellfish," in the same way that "kaki" (oyster) is a name derived from its harvesting method - such as scraping off ("kaki-otosu") or knocking off ("uchi-kaku") from rocks. Together with that, among the shellfish that emerge from prehistoric kitchen midden (refuse dumps) - "shell mounds," it has, along with the hard clam and such, always occupied a large relative weight.

In contrast to the somewhat smug, perhaps even aristocratic, unique characteristic flavour given off by the oyster, the Japanese short-necked clam is tasty, full of nutrition and moreover cheap, and can be served up for eating without any qualms - a typical people's seafood, so to speak. Until about a couple of decades ago, as long as there was a sandy beach suitably mixed with mud, it multiplied virtually without a hand, such as to create the tacit understanding that "water and air and Japanese short-necked clams are free," and it had a presence that could never be missed as a target of low-tide shellfish gathering.

Entering the high-level economic growth period, however, as the coastal tidelands and sandy beaches became reclaimed and got transformed into seaside industrial zones, the yield has decreased, and in some quarters it came to be murmured that "by specializing in Japanese short-necked clams a house can be built," with the price perforce soaring rapidly. In this connection, if we compare the rate of climb in the unit price of the Japanese short-necked clam and oyster over the past 20 years, in contrast to the oyster rising 8 - 9 times, the Japanese short-necked clam has risen as much as an amazing 14 - 15 times, indicating a rate of price rise nearly double that of the oyster. Recently, the utility of tidelands is being re-looked at from the aspect of the protection of nature or as a place of recreation for the people, and the fact that the construction of artificial sandy beaches and tidelands is being vigorously advanced everywhere is a welcome thing.

On the other hand, the Japanese short-necked clam has been favoured, not only in the areas of fisheries and utilization, but from old for the changes in the soberly delicate patterns decorating its shell, which were artistically affectionately named "Shikago," "Yamabuki," "Toten," "Uzuramadara," "Shirakari," etc., and there is a history of its being prized among townspeople. In recent times as well, from a natural scientific interest, the instances where the variation in the coloured spots of the Japanese short-necked clam has become the object of research are not confined to a few. The best of them is a study of the "Variation in shell spots of the Japanese short-necked clam, with particular reference to their bilateral asymmetry" by the late Dr. Iwao TAKI (see page 31) done at the Hiroshima University Marine Biological Station which is the base of our Hiroshima Shellfish Club. The professor, during the difficult period of material shortage towards the end of World War Two, collected the shells of as many as 100,000 Japanese short-necked clams from all over the country and undertook a thorough analysis, explaining the law of the variation in the spots as well as making it clear that the difference in the spots of the Japanese short-necked clam between the right and left of the shell is an extremely unique phenomenon not seen in the animal world, or widely speaking, in the entire animal and plant world.

In this way, even though it lies very close to us and is something that can be easily obtained regardless of the season, there are still many, many more unknown parts that are hidden with respect to its morphology (dissection) and physiology, or classification and ecology, etc., as well. It is an object of inexhaustible interest as a teaching material from elementary school to university, and as research material as well. If this booklet could perhaps serve as a guide for that, it would be fortunate.

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